Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

APRIL 1957

One of Five Simmons-Boardman Railway Publications

formerly Railway Mechanical and Electrical Engineer

Upgrading Freight Cars

C&NW Fuel Tests

SP Diesel Cleaning

Transporting Elec. Equip. for Repairs

CORRELATED UNITS MAKE HOPPERS

Structurally sound..

Your best STANDARD assembly..

All cast steel!

Hopper Frames, Adjustable Locks and Hinges

THE WINE RAILWAY APPLIANCE CO., TOLEDO 9, OHIO

PROVED!
DEPENDABLE TRACTION MOTOR GEAR LUBRICATION FOR OVER 6 MONTHS WITHOUT GREASE ADDITION!
NEW ESSO ARAPEN GEAR LUBRICANT

Extensive 18 month on-the-road tests by the New York Central Railroad have *proved* that Esso Standard's new Arapen Gear Lubricant gives completely dependable traction motor gear lubrication for well over six months. During the six-month periods *no* additional lubricant was required. Arapen outlasted the previously used lubricant by at least 6 to 1!

New Esso Arapen Gear Lubricant is another exclusive development of Esso Research. For further information and technical assistance in the use of Arapen Gear Lubricant, call your local Esso office, or write: Esso Standard Oil Company, Railroad Sales Division, 15 W. 51st Street, New York 19, N. Y.

Performance advantages of **ARAPEN GEAR LUBRICANT:**

Reduced Leakage: maintains consistency through full range of operating temperatures, minimizing drippage on ties, pits and station platforms.

Improved Oxidation Stability: permits extended operation without hardening.

Excellent Structure Stability: reduces failures due to dry gears caused by excessive gear case leakage.

Better Anti-Wear Characteristics: high grease retention assures proper gear protection for prolonged time.

Esso

RAILROAD PRODUCTS

HOW EFFICIENT IS THIS OPERATION?
HOW GOOD
IS THE FINISHED PRODUCT?

Whether you are concerned with manufacturing or with purchasing rolling stock, these are questions of vital concern to you—for ultimately they govern the durability and cost of the end product. Here is just one example how HELIARC welding is helping railroads gain new product quality at substantial savings . . . the unit being fabricated is a galvanized iron and mild steel refrigerator car.

Welding Speeds Average 30 In. Per Minute

Semi-automatic welding requires no special skill, and speeds two to three times faster than manual welding can be easily maintained. The HELIARC welded side and floor panels shown are fabricated of 14 and 20 gage galvanized iron and mild steel.

309 Ft. Of Top-Quality Welds Per Car . . . Minus Flux

In HELIARC welding, argon gas automatically shields the weld puddle from contaminating effects of the atmosphere. All 31 butt, lap, and flange joints in each car are of the highest quality.

Find out about the particular welding installation that can increase your production speed and unit quality. Call your local LINDE representative for detailed information on LINDE's modern methods for joining metals.

Semi-automatic HELIARC welding torch speeds and simplifies fabrication of refrigerator cars.

RAILROAD DEPARTMENT

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto

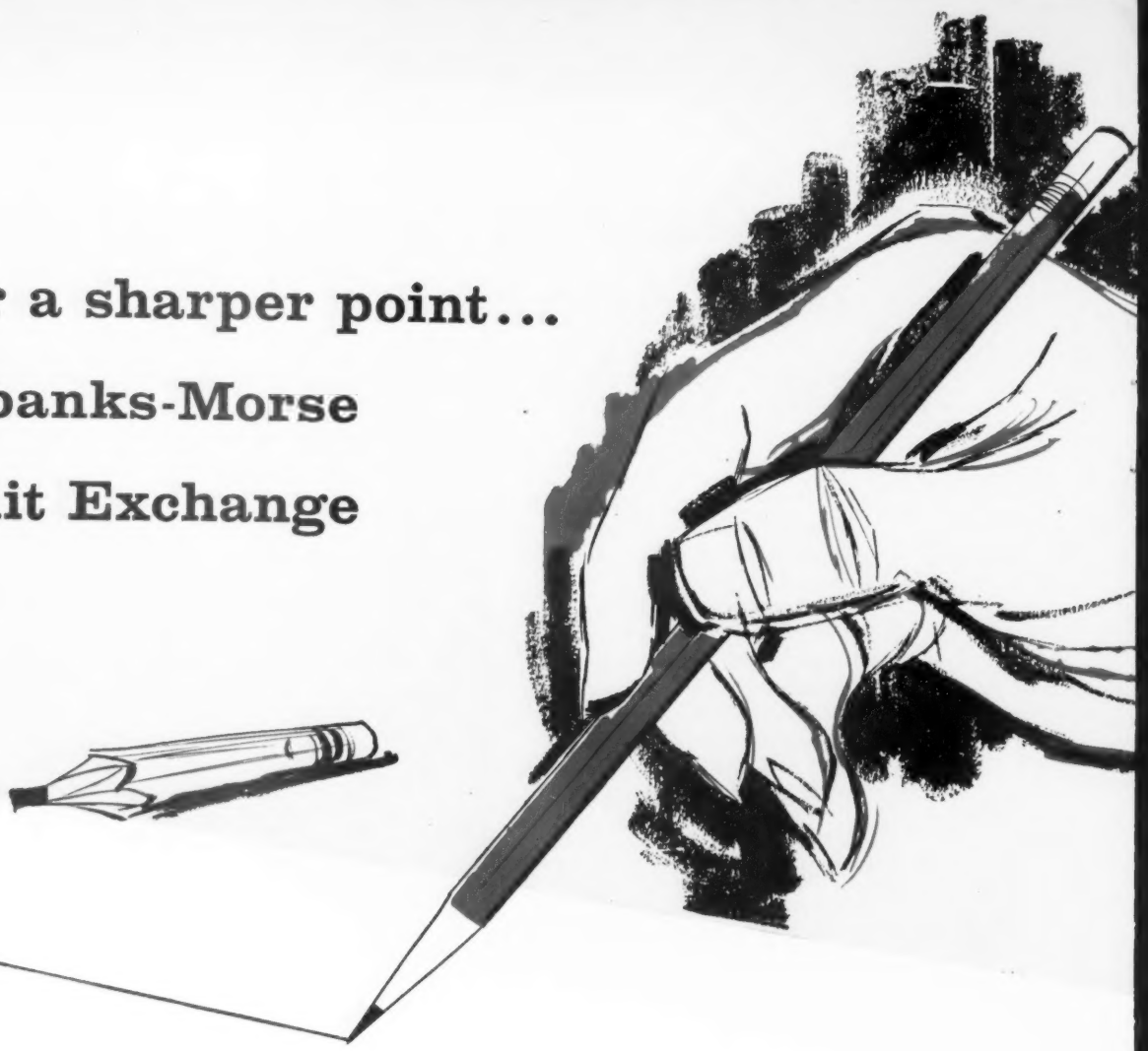
"Linde" and "Heliarc" are registered trade-marks of Union Carbide and Carbon Corporation.

Supplying to railroads the complete line of welding and cutting materials and modern methods furnished for over forty years under the familiar symbol - - -

for a sharper point...

Fairbanks-Morse

Unit Exchange



F-M Unit Exchange provides a way to meet increased tonnage demands on your motive power fleet—yet reduces your need for repair shop facilities . . . large parts inventory.

In minimum time you can upgrade your F-M power . . . exchange complete engines, blowers, pumps, F-M generators and traction motors. Your exchange equipment meets brand-new specifications and performance. And it carries the same warranty as new equipment.

Unit Exchange offers you the quickest way to return a locomotive to more profitable service at reduced maintenance. Fairbanks, Morse & Co., Dept. RLC-4, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL LOCOMOTIVES AND ENGINES • MOTOR CARS AND RAILROAD EQUIPMENT • ELECTRIC MOTORS • GENERATORS • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAND LAMPS

PUBLISHED MONTHLY BY THE

SIMMONS-BOARDMAN

PUBLISHING CORPORATION

EDITORIAL AND EXECUTIVE OFFICES:
30 Church Street, New York 7

ROBERT G. LEWIS
Publisher, New York

H. C. WILCOX
Editor, New York

A. G. OEHLER
Electrical Editor, New York

F. N. HOUSER, JR.
Associate Editor, New York

J. F. BERGE
Associate Editor, New York

LILLIAN D. MILNER
Editorial Assistant, New York

NORMAN E. GILLESPIE
Western Editor, Chicago

C. W. MERRIKEN, JR.
Business Manager, New York

MICHAEL J. FIGA, JR.
Director of Production, New York

BRANCH OFFICES: 1081 National Press Bldg., Washington 4, D. C., Terminal Tower, Cleveland 13; 214 Terminal Sales Bldg., Portland 5, Ore.; 244 California Street, San Francisco 4; 1151 West Sixth Street, Los Angeles 17; 3908 Lemmon Ave., Dallas 19, Tex.

FOREIGN REPRESENTATIVES: Sibley-Field Publishing Company, Ltd. 103 Newgate St., London E. C. 1, England; Georg J. Linder, Continental European Representative, (16) Frankfurt a.Main Wittelsbacher Allee 60 West Germany

Railway Locomotives and Cars is a member of the Associated Business Papers (A.B.P.) and the Audit Bureau of Circulation (A.B.C.) and is indexed by the Industrial Arts Index and also by the Engineering Index Service, Printed in U.S.A.

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal

APRIL, 1957 VOLUME 131, No. 4

MOTIVE POWER AND CAR

C&NW Diesels Will Not Get "Economy" Fuels 47
What Should Your Upgrading Accomplish? 50
SP Specifies the "What" and "How" of Diesel Cleaning 56
Plug Door: Solution for All-Purpose Box Car 62
Lapping Operations Speed Up Output 64
Filters Cleaned—While You Wait 65

IDEAS FOR THE DIESEL REPAIR MAN 66

ELECTRICAL

Alco and EMD Units Run M-U 68
Roll Them Out Like New—Part 2 70
A Piece of String 74
What Is the Function of Brushes in Commutation? 75
What Thermal Capacity Means . . . Getting the Most Out of Motors 76
Three-Part Car Will Carry Huge Transformers 76

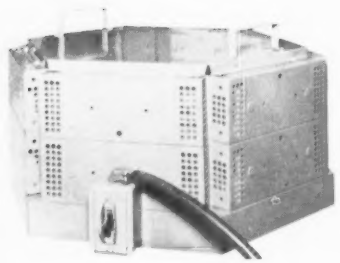
DEPARTMENTS

Equipment New Ideas—New Uses 6
News 12
Personal Mention 12
Supply Trade Notes 16
Questions and Answers 78
Index to Advertisers 104

Published monthly by the Simmons-Boardman Publishing Corporation James G. Lyne, President; Arthur J. McGinnis, Exec. Vice-Pres. and Treas.; Fred A. Clark, Vice-Pres. and Sec. Entered as second-class matter January 16, 1953, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription price to railroad employees only in U. S. possessions and Canada, $2 one year, $3 two years, payable in advance. Subscription price to railroad employees elsewhere, $8 per year. **Single copies, 50¢. R. C. Van Ness, Director of Circulation,** 30 Church St., New York 7, N. Y.

NEXT MONTH:

LV Power Plant
Color Schematics
Erie Wheel Shop



Pinion and Bearing Race Heater

A general purpose infra-red oven, designed to meet the increasing need for a portable and low cost source of radiant energy has just been made available. It is well adapted for most shrink fitting operations, including bearing races, pinions, couplings and other machine parts. A specific application of the new unit is the heating of diesel locomotive traction motor pinions to proper temperatures for shrink fitting on motor shafts.

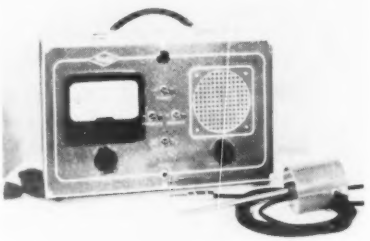
The oven is rated 6,000 watts and can be operated on 110-, 220- or 440-volt circuits. Fast acting with no warm-up period, it weighs 48 lb. complete, and can conveniently be carried by one man. The interior is Alzak-coated specular aluminum for high reflectivity and resistance to oxidation. A separate asbestos insulated base has four Marinite standoffs to insure radiation to the under surfaces of the product being heated. The radiant energy source is 12 General Electric 500-watt T-3 tubular quartz infra-red lamps having a life in excess of 5,000 hours at rated voltage. *Lighting Division, Safety Industries, Inc., Dept. RLC, Milford, Conn.*

Diesel Lube Oil

A new diesel lubricating oil for locomotives has been released after a 330,000-mile test. The lubricant, Gulf Dieselmotive 78, is formulated from base stocks with reported inherent film strength, lubricity, and excellent oxidation characteristics. The refiners say that the response of the special base stock to carefully prepared additives produces a diesel lubricant with outstanding oxidation resistance and reserve detergency for railway service.

This oil, under certain conditions, has actually increased the tonnage ratings on the locomotives. It was developed to enable engines to deliver full-rated horsepower under conditions of maximum output for extended periods under high ambient temperatures.

In the 330,000-mile test, two EMD 567-C units were employed on freight hauls where the ambient temperatures ranged from 0 to 110 deg. A detailed inspection of the engines was made after each of the two locomotive units had been run 165,825 mi. Rings and ring grooves, as well as intake ports, were clean. Deposits under the piston crowns were negligible. There were no heavy deposits or varnish anywhere in the engines. Bearing shells were found free of lacquer and put back in the engine for further service. There was no corrosive etching at the edge of silver plating adjacent to grooves of the wrist pin bushings. There was no evidence of scuffing on the silver plating, and the bushings were reinstalled for additional service. Wear of thrust washers was well below condemning limits. Hard carbon deposits were absent from exhaust valves and valve stems showed no significant lacquer or carbon deposits at the point of valve travel limit. *Gulf Oil Corporation, Dept RLC, 1822 Gulf Building, Pittsburgh 30*



Electrified Screwdriver

The screwdriver used for listening to bearing noises has been electrified by connecting it with a compact electronic amplifier and producing a bearing tester. Resembling a portable radio in size and appearance, the instrument can be used in any shop for preventive and plant maintenance or quality control.

The tester detects and measures wear in bearings, gears, spindles or slides without disassembly of machinery. It enables plant maintenance engineers to keep machinery operating at established performance standards.

The instrument consists of a metal probe or pick-up, connected by an electric cord to a compact electronic amplifier equipped with calibrated meter, loudspeaker, controls and, if desired, with devices for making permanent records. Its power supply is any convenient electric outlet. *Sperry Products, Inc., Dept RLC, Danbury, Conn.*

Injection Type Cable Splices

A method of protecting and insulating electrical splices with epoxy resin injected into a mold tailor-made in the field has been announced. Called the Scotchcast resin pressure splice, the method is applicable to both buried and aerial cable. Lead, rubber and plastic sheathed cable or combinations of these as well as shielded cable can be spliced.

The pressure splice method uses an open mesh screen-like tape as a spacer material, wrapped around the splice. This build-up of an open screening is covered with a liquid-impervious plastic tape holding an injection fitting to allow entry of the resin into the splice. The plastic tape in turn, is covered with a low stretch tape to restrict the expansion of the plastic envelope when resin is forced into the splice.

The adaptability of the method allows the mold to be tailor made for each splice, providing moisture-proof, void-free, high dielectric strength insulation around nearly any size or shape of splice. It is claimed to make possible uniform quality splices in less time than previous methods and to remove much of the factor of human error. The splices can be made by electricians without extensive special training or experience.

Resin for impregnating the splice is supplied in a plastic envelope which holds resin on one side of a dividing membrane and a hardener, or activator, on the other. When the divider is broken, the resin and activator are mixed by squeezing the ends of the container forming a resin which sets up or cures through internal heat. Spacer tape be-

(*Continued on page 8*)

Boxcar with Evans 19-belt DF (TM) Loader and Nailable Steel Flooring

N-S-F* helps RAILROADS PROTECT INVESTMENT IN HIGH-REVENUE SPECIALLY EQUIPPED CARS

NAILABLE STEEL FLOORING is made of N-A-X HIGH-TENSILE steel. Evans DF Loaders also use this light, sturdy metal in major components.

Specially equipped high-revenue cars stay in service longer when provided with NAILABLE STEEL FLOORING. Down time for floor repairs is substantially reduced because N-S-F stands up under the heavy impact of lift truck loading. And N-S-F adds structural strength to critical points in the underframe.

Full information about N-S-F is readily available from Stran-Steel representatives in Chicago, New York, Philadelphia, St. Louis, Cleveland, San Francisco, Minneapolis and Atlanta. In Canada, N-S-F is made and sold by International Equipment Co., Ltd., Montreal.

*N-S-F (TM): NAILABLE STEEL FLOORING
Made and sold by
STRAN-STEEL CORPORATION
Detroit 29, Michigan • A Unit of
NATIONAL STEEL CORPORATION

I-R TORSION BAR TORQUE CONTROL

TORQUE CONTROL IMPACTOOLS

consistently run nuts to prescribed torques

I-R Torsion-Bar Impactools now assure top quality control on these 3 operations:

1. *Assembling differential main bearing caps at 450 ft. lbs. both before and after machining as shown above.*
2. *Preloading differential drive pinion bearing with Impactools set at 375 ft. lbs.*
3. *Assembling wheels to wheel hubs at 425 ft. lbs.*

Quality control has risen to a new high for this large manufacturer of farm equipment since I-R Torsion-Bar Torque Control Impactools were installed.

These Impactools are the *only* power wrenches that deliver full power and speed until the preset torque is reached, and then instantly and automatically shut off.

Now, with Torque Control Impactools, the company consistently runs nuts to prescribed torques, saves time, improves quality and eliminates hand torque checking operations.

Write for Bulletin 5170 for proof of how these amazing Impactools can improve quality and cut costs on your own applications.

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

8-524

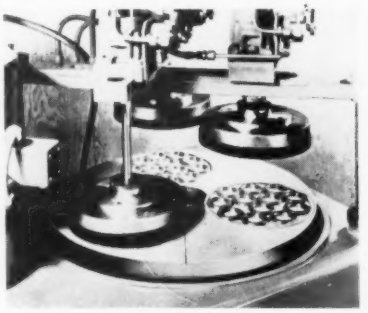
EQUIPMENT

(Continued from page 6)

tween the wire joint and an outer wrapping provides space into which the epoxy resin is forced through an injection fitting by means of a pressure gun. *Minnesota Mining & Manufacturing Co., Dept. RLC, St. Paul, Minn.*

Damage-Proof Electrical Connectors

A new line of compact, lightweight electrical connectors for military and industrial applications has been placed on the market. Known as the Pyle-Star-Line, these new plugs and receptacles are said by the maker to be impervious to water, moisture, oil, gas, dust, pressure, vibration and shock. The connectors meet and exceed performance requirements of class A, B, C, and E of military specifications MIL-C5015B as well as NEMA requirements for power, lighting, control and coaxial circuits. *Pyle-National Company, Dept. RLC, 1334 N. Kostner ave., Chicago 51.*



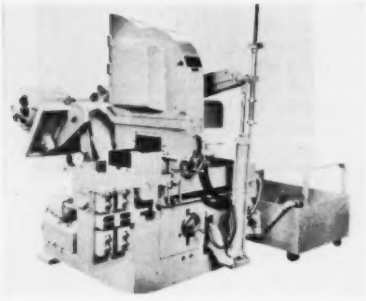
Polishing Equipment for 24-in. Lapping Machine

Polishing accessories and equipment are now available for converting the 24-in. lapping machine into a high-speed polishing unit.

The tooling consists of a special lap plate and pneumatic lifts. Sponge Neoprene pads are added to the pressure plates. There are 4/0 polishing paper discs and a double sided sensitive tape is used for mounting the polishing paper to the lap plate. Conversion can be readily accomplished in the plant.

The machine is especially suitable for parts requiring low RMS finishes, from 2 to 4, and flatness can generally be held under 3 light bands.

An alloy polishing plate is recommended to obtain closer finishes. *Crane Packing Co., Dept. RLC, 6400 Oakton st., Morton Grove, Ill.*



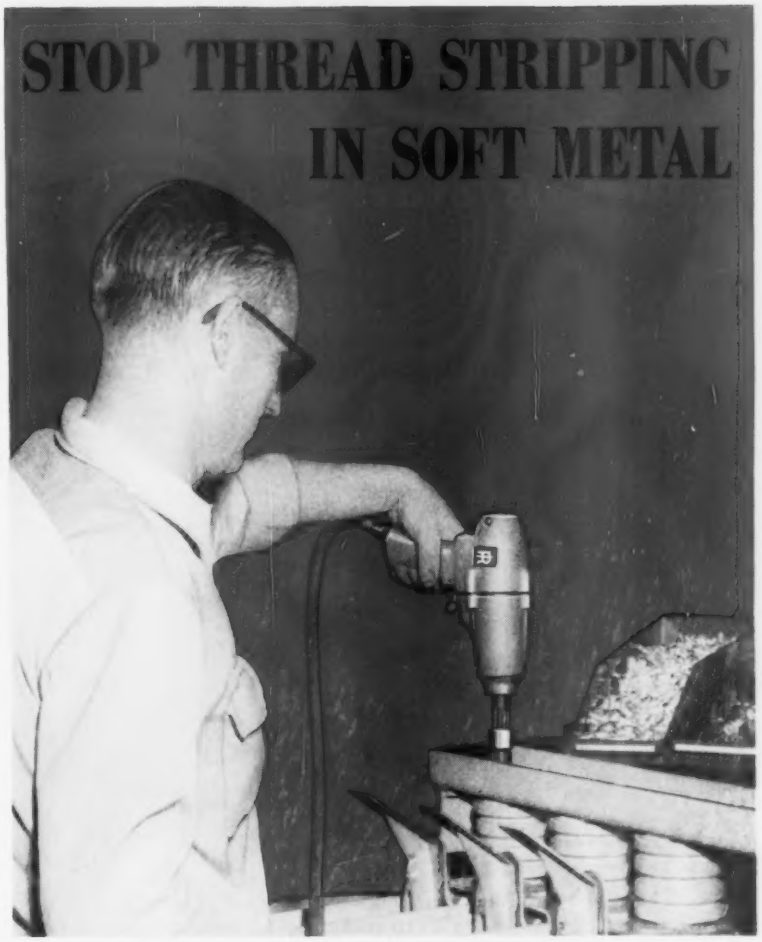
Wet Abrasive Cutting Machine

Model 481 wet abrasive cutting machine is designed to cut large diameter bar stock, tubing, and other shapes. Equipped with a 26-in. diameter Allison Abrasive cutting wheel, it will cut any conventional metal including corrosion resistant steel as well as many hardened or annealed types. This model is an oscillating type in which the wheel feed and work clamps are hydraulically operated and the work bar is hand fed. The oscillating motion was selected to reduce the amount of abrasive wheel contact; cutting is achieved with a reported minimum of wheel pressure.

The main bed is heavily ribbed, welded steel and includes a self-draining coolant collector. The forged alloy steel spindle is heat-treated, precision ground, dynamically balanced, and mounted in a separate housing, adjustable to accurate alignment. The spindle is mounted at the abrasive wheel and in a double row oversize ball bearing and at the opposite end in a double row self-aligning roller bearing. Both housing ends have labyrinth type seals to exclude dirt and moisture.

The motor bracket supports a separate motor pulley bracket equipped with outboard, self-aligning roller bearings. The motor is connected to the pulley unit with a coupling to relieve the belt load from the motor bearings. A turnbuckle type bracket provides belt tension adjustment regardless of the amount of load imposed by the cutting wheel.

The oscillating unit is driven by a constant speed, 1 hp geared head motor. In brief, the oscillator link mechanism causes the abrasive wheel to move back



here's how it's being done with Ingersoll-Rand

TORQUE CONTROL impactools!

If you assemble soft metal threaded parts, such as aluminum or bronze, take a look at the improvement record made by this large electrical manufacturing company.

Parts spoilage is substantially reduced and product quality greatly improved since changing from conventional air powered wrenches to new Ingersoll-Rand Torque Control Impactools for running nuts and cap screws. These revolutionary Impactools shut off instantly and automatically when the preset torque is reached. No more stripped threads . . . and every fastener is precisely tightened for top quality.

Call or write for bulletin 5170, or ask for an obligation-free demonstration.

8-523

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

with powerful
C&D Diesel
Starting Batteries

These powerful heavyweights—built for toughest railroad duty—pack the extra wallop it takes to crank those big diesels over *fast!* Full quarter-inch-thick positive plates (more grid metal than you'll find in any other heavy-duty battery) provide power-plus. Exclusive C&D *Slyver-Clad*® construction cuts down on wasted sediment space . . . uses the room for extra long plates.

C & D Diesel Starting Batteries mean:

1. High sustained voltage during cranking
2. Reduced maintenance requirements
3. Reduced connection loss

FOR COMPLETE DETAILS WRITE FOR BULLETIN DL-576.

PASSENGERS STAY COMFORTABLE with C&D Car Lighting and Air Conditioning Batteries

C & D MEANS:

1. Lowest annual cost
2. Sustained high voltage for maximum time
3. Reduced connection loss

For complete details, write for Bulletin AC-546.

C&D BATTERIES, INC.
of Conshohocken, Pa.

50th ANNIVERSARY

INDUSTRIAL BATTERIES SINCE 1906

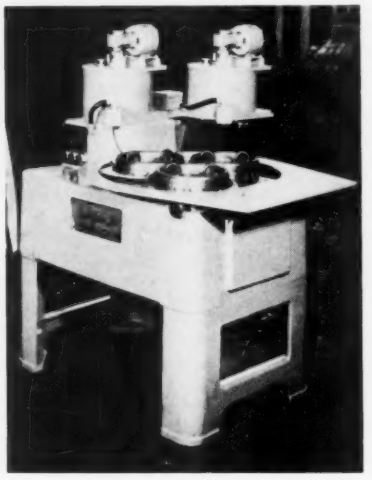
SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

and forth across the work piece, as it is fed hydraulically through the work piece.

For safety, the wheel guard is fixed to the bed and encloses the wheel except for work entry openings. The abrasive wheel is accessible through a hinged door and coolant splash guards are included for the full range of material sizes.

The coolant system originates in a wheel mounted, separate tank. This was was done to permit easy removal for chip cleaning. Compartments settle out the sludge to keep the coolant clean. From here it is pumped to an adjustable coolant box with baffle plates between which the abrasive wheel rotates. This is to assure equal wetting of both sides of the abrasive wheel, as well as bringing the coolant directly to the cutting area.

Model 481 has a 25 hp, 1,800 rpm, totally enclosed, fan-cooled motor to drive the abrasive wheel. The spindle is driven through multiple V-belts. The controls are painted red for ease of operation and all interior parts are cadmium plated to prevent rust. This cutting machine is 100 in. long, 85 in. wide, and 84 in. high. Its weight, with the electrical equipment, is approximately 6,800 lb. *American Chain & Cable Co., Dept RLC, 929 Connecticut Ave., Bridgeport 2, Conn.*



24-in. Lapping Machine With Dual Agitator Tank

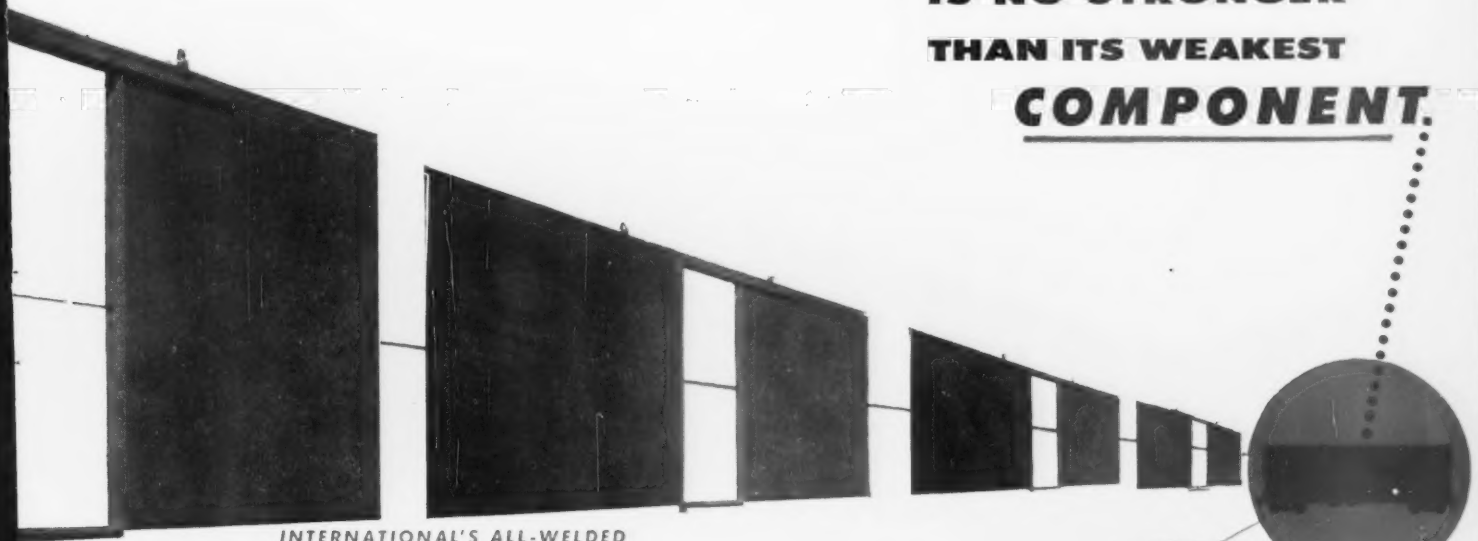
A new dual agitator tank attachment now permits coarse and fine lapping on the 24-in. lapping machine. Coarse abrasive is used in one tank and fine abrasive in the other.

Where lapping tolerances are not critical, it is unnecessary to change laps and conditioning rings when switching from one tank to another; only the lap plate needs cleaning. Roughing to finishing and back to roughing can be done in one continuous operation. A single set of conditioning rings and one lap plate makes a complete installation.

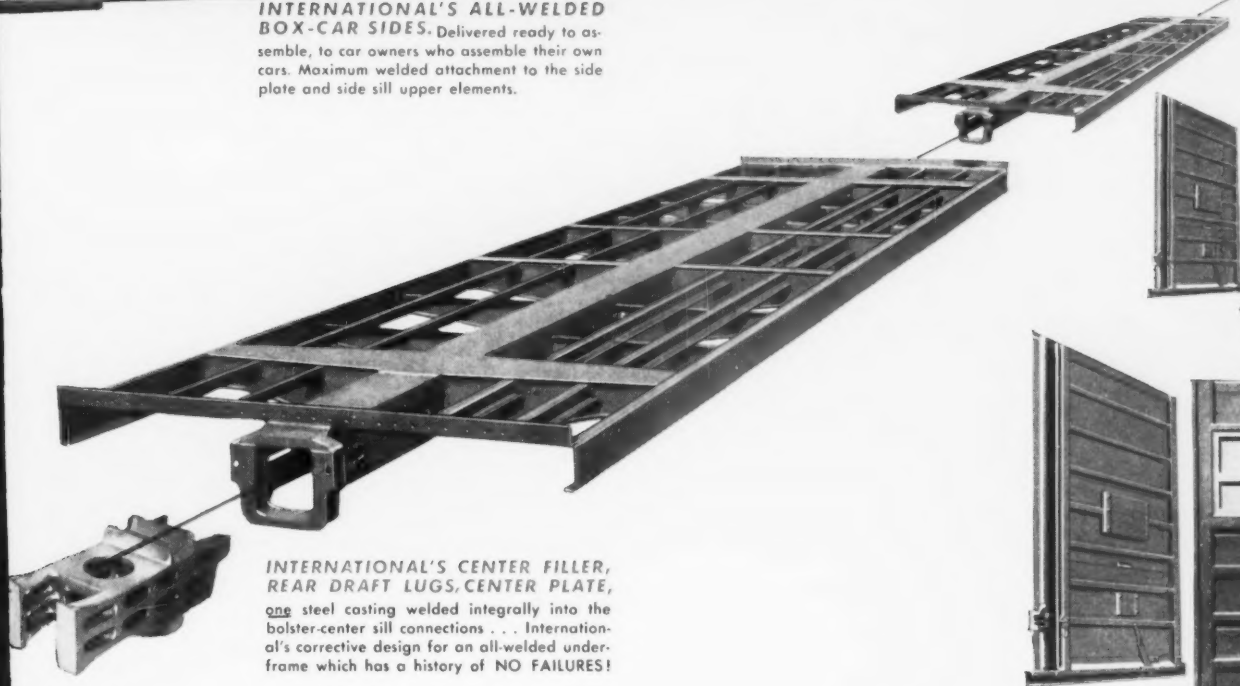
Where fine lapping is required, a second

(*Continued on page 84*)

A FREIGHT CAR IS NO STRONGER THAN ITS WEAKEST *COMPONENT.*



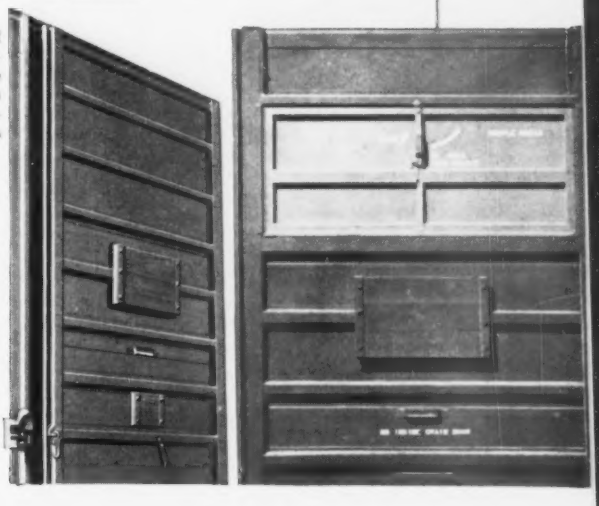
INTERNATIONAL'S ALL-WELDED BOX-CAR SIDES. Delivered ready to assemble, to car owners who assemble their own cars. Maximum welded attachment to the side plate and side sill upper elements.



INTERNATIONAL'S CENTER FILLER, REAR DRAFT LUGS, CENTER PLATE, one steel casting welded integrally into the bolster-center sill connections . . . International's corrective design for an all-welded underframe which has a history of NO FAILURES!

INTERNATIONAL'S BULK-LADING SIDE DOOR. Requires no inside grain door . . . and has an access door for loading, inspection and sampling. Positive retainment on the car structure.

The ***UTILITY DOOR*** without the grain loading feature has the same inter-locking features and sturdier International construction as the Bulk-lading door.



INTERNATIONAL STEEL COMPANY
RAILWAY DIVISION
EVANSVILLE 7, IND.

Precision fabricators of correctively designed components

J. D. Ristine

Ristine Becomes Executive Secretary ARSA

John D. Ristine has been elected executive secretary of the Allied Railway Supply Association and secretary of the Committee of the Coordinated Associations, with offices at 80 East Jackson Blvd., Chicago 4. Mr. Ristine, who succeeds R. E. Coughlan, resigned, will continue to represent the Frost Paint & Oil Corp. of Minneapolis in Chicago.

Electronic Hot-Box Detector Installed on Reading

An infrared ray system to detect hot boxes has been installed on the New York branch of the Reading. Use by the railroad of thermal relays for experimental remote-control operation of a diesel locomotive to combat motor freezing also has been announced. "Application of infrared rays to numerous railroad operating problems has tremendous future possibilities," according to E. Paul Gangewere, Reading vice-president, operation and maintenance.

The hot-box detector consists of an infrared camera, the lens of which records the temperature of each passing journal. A thermal relay operates to indicate any overheated journal at either next signal or first control tower ahead.

Cast-Steel-Wheel Tests To Continue

Despite approval, as an AAR standard, of the one-wear cast steel wheels on March 1 for freight-car service, both of the large producers of these wheels, Griffin and the Southern Wheel Division of American Brake Shoe Company, will continue obtaining data on test wheels now in service. A high percentage of the initial application of these wheels are still rolling up mileage.

In the item on page 14 of the March issue entitled "AAR Approves Cast Steel Wheel," the AAR quarterly report of mileage to date is shown for both companies. The figures given are actually the average, accumulated mileages. From the additional data to be obtained, both companies expect far greater mileages will be reflected before completion of tests.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (thousands)	No. of cars set off between division terminals because of hot boxes			Miles car set off
		System	Foreign	Total	
December, 1952	2,869,929	1,742	3,632	5,374	534,040
December, 1953	2,656,063	1,581	2,550	4,131	642,958
December, 1954	2,751,644	1,501	2,294	3,795	725,070
1955					
January	2,714,070	1,813	2,701	4,514	601,256
February	2,517,483	2,266	3,970	6,236	403,701
March	2,830,398	2,717	5,076	7,793	363,197
April	2,787,705	3,471	6,485	9,956	280,002
May	2,931,850	4,860	8,664	13,524	216,788
June	2,945,955	6,080	10,226	16,306	180,666
July	2,906,558	8,086	13,635	21,721	133,813
August	2,954,439	8,555	14,358	22,913	128,941
September	2,923,592	5,896	10,469	16,365	178,649
October	3,025,177	3,966	7,182	11,148	271,364
November	2,950,228	2,010	3,972	5,982	493,184
December	2,922,034	1,819	3,774	5,593	522,444
1956					
January	2,925,109	2,029	4,302	6,331	462,029
February	2,794,161	2,570	5,611	8,181	341,542
March	3,027,684	2,517	6,212	8,729	346,853
April	2,930,389	3,202	6,881	10,083	290,626
May	3,063,427	4,672	10,903	15,575	196,688
June	2,973,732	6,777	15,125	21,902	135,774
July	2,788,347	8,484	16,067	24,551	113,573
August	3,039,173	9,891	16,892	26,783	113,474
September	2,918,875	6,834	12,629	19,463	149,970
October	3,113,460	4,357	8,429	12,786	243,505
November	2,953,625	2,650	5,560	8,210	359,759
December	2,933,940	2,256	4,436	6,692	438,425

Miscellaneous Publications

ASTM STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS. Compilation includes 180 standards, 48 of which are new or revised, on methods of tests, specifications, definitions of terms and classifications of petroleum products and lubricants with related information, including report of ASTM Committee D-2 on Petroleum Products and Lubricants, and proposed methods of test. *American Society for Testing Material, 1916 Race st., Philadelphia 3. Price: cloth cover, $7.50; paper cover, $6.75.*

Personal Mention

Baltimore & Ohio

W. H. BEITCHER, general car foreman at Indianapolis, retired.

Canadian National

W. H. WOODHOUSE appointed road foreman of engines, Hornepayne division, Hornepayne, Ont.

S. A. MCLEOD appointed road foreman of engines, Capreol division, Capreol, Ont.

W. W. ALWAY, car foreman at Stratford, Ont., appointed car foreman at Sarnia.

Chesapeake & Ohio

C. J. TOLLOFF has been appointed district car foreman at Saginaw, Mich.

W. V. MOSELEY appointed assistant to superintendent motive power at Richmond, Va.

J. E. FOSTER, assistant to superintendent motive power at Richmond, Va., retired.

H. F. SHANNON appointed assistant district general car foreman in Milwaukee Terminals. Headquarters Davies Yard.

Denver & Rio Grande Western

Denver, Colo.

O. D. BENSON appointed mechanical engineer at Denver, Colo.

J. P. SPIESS appointed shop engineer.

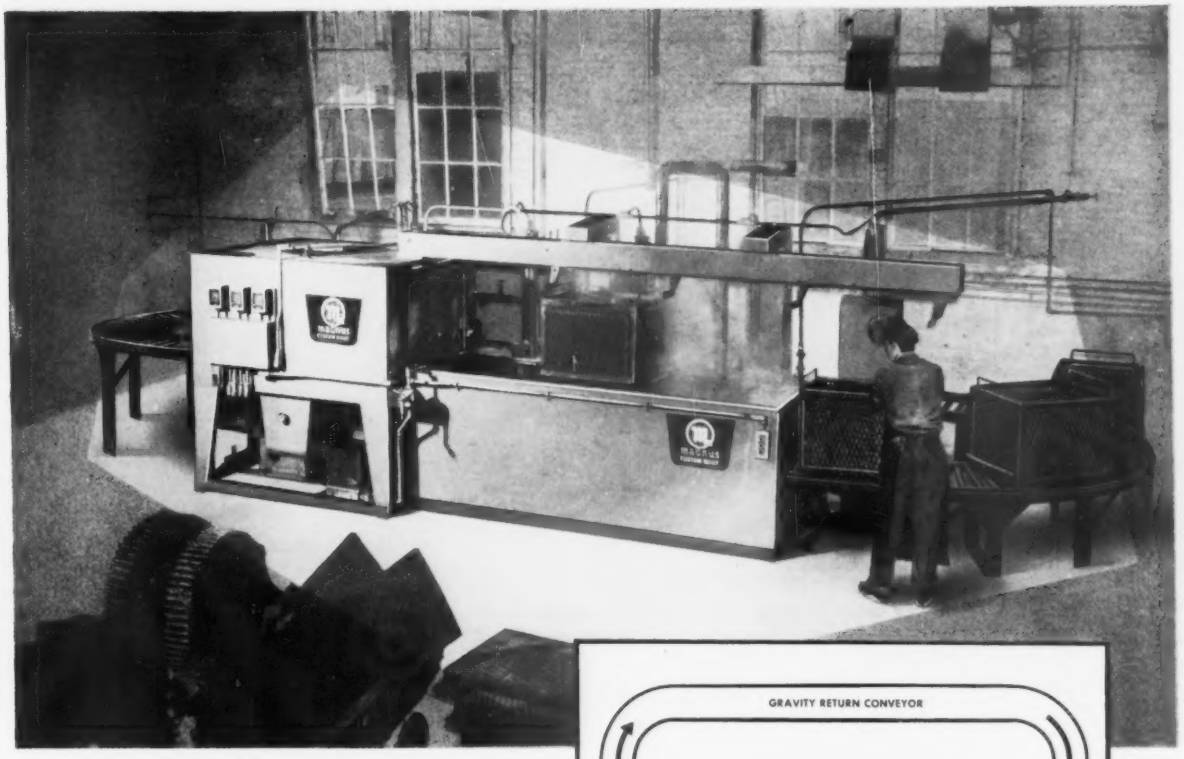
Erie

ROBERT E. CURTIS appointed division car foreman at Port Jervis, N. Y.

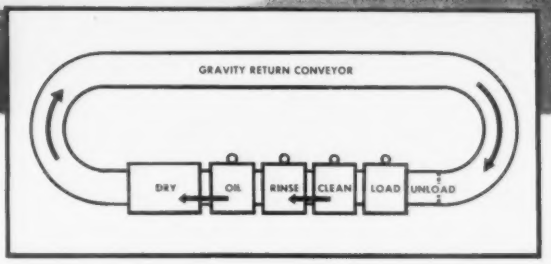
Minneapolis & St. Louis

W. J. WEATHERALL appointed superintendent car department, Minneapolis. Formerly sales engineer, Pacific Car & Foundry Co.

(*Continued on page 14*)



Completely automatic filter-cleaning installation at Elizabethport, N. J. diesel shop of Jersey Central.



JERSEY CENTRAL NOW CLEANS 3 TIMES MORE DIESEL FILTERS!

AUTOMATICALLY! CLEANER! FASTER!

Completely automatic—from the moment that dirty filters are loaded in the baskets—until they are removed—ready to use—this *one* new Magnus Automatic Filter Dip machine *cleans, rinses, oils,* and *dries* diesel filters . . . not singly, but in *batches* . . . up to 96 per hour . . . without any further manual handling. Jersey Central reports that one operator is now able to clean 3 times as many filters as previously, *yet with more free time for other jobs.* Moreover, they report that the filters are *cleaner than ever* before . . . far cleaner than when the previous time-consuming, expensive method was used.

For full information on this new Magnus machine—or on other Magnus cleaning machines, materials and methods—write Magnus, 77 South Ave., Garwood, New Jersey.

magnus

RAILROAD DIVISION

MAGNUS CHEMICAL CO., INC.

a world-wide organization specializing in cleaning and protection of all surfaces.

PERSONAL MENTION

(Continued from page 12)

New York Central

JOHN J. KEATING, assistant master mechanic, locomotive department, Collinwood, Ohio, appointed master mechanic, locomotive department, Toledo.

VAUGHN E. SCOTT appointed master mechanic, locomotive department, Columbus, Ohio.

F. F. DUBAY appointed superintendent of shop at W. Detroit.

M. M. O'NEILL appointed lubrication engineer at New York.

F. J. MURRAY appointed assistant engineer—steam heat, at New York.

TECHNICAL RESEARCH DEPARTMENT

Collinwood, Ohio

Manager, material inspection: A. T. GREEN

Supervisor, material inspector: H. C. RIDER

Chief chemist: H. WOCHELE

Microscopist: G. J. FRANK

Spectrographer: W. C. HARSH

Supervisor, material tests: W. S. GORDON

Supervisor, Mechanical Laboratory: W. E. LENTZ

Mechanical Laboratory assistant: H. D. GLASS

New York, New Haven & Hartford

New Haven

ROBERT W. HOOPER, acting general mechanical superintendent, appointed chief mechanical officer.

RUSSELL H. DAVIS, assistant chief mechanical officer, appointed assistant general mechanical superintendent.

GEORGE A. CLARKE, mechanical engineer, appointed assistant general mechanical superintendent.

RALPH B. HART, assistant to chief mechanical officer, appointed assistant to general mechanical superintendent.

WILSON E. SYMONS, general master mechanic, appointed mechanical engineer.

DONALD S. ONNEN, assistant chief mechanical officer, appointed chief engineer of equipment.

WILLIAM A. BAKER, assistant chief mechanical officer, appointed general superintendent of locomotive maintenance.

WILLARD B. CROWLEY, assistant mechanical engineer, appointed electrical engineer.

HERBERT C. SCOVILL, resident equipment engineer, appointed assistant electrical engineer.

Pennsylvania

W. J. MADDEN, assistant electrical engineer, retired.

Southern

Alexandria, Va.

HARRY B. DUNDON, JR., appointed general foreman.

Atlanta, Ga.

THOMAS S. HOOPER appointed general foreman.

CLAUDE O. GARVIN appointed general foreman. Formerly general foreman at Columbia.

PRINCE B. ELEAZER, JR., appointed general foreman.

Charlotte, N. C.

WILLIAM M. GADDY appointed general foreman.

WILLIAM M. ALMON appointed general foreman.

WILBUR D. SHUTS, master mechanic at Macon, Ga., appointed master mechanic at Alexandria, Va.

ARCHIE G. WALDRUPE, assistant master mechanic at Atlanta, Ga., appointed master mechanic at Macon, Ga.

CLARENCE A. FRICK, master mechanic at Columbia, S. C., appointed master mechanic at Birmingham, Ala.

HARRY B. ROSENSTEIN, master mechanic at Chattanooga, Tenn., appointed master mechanic at Columbus, S. C.

OLIVER H. SMART, assistant master mechanic at Spencer, N. C., appointed master mechanic at Chattanooga, Tenn.

MANLEY H. HAMMETT, master mechanic at Birmingham, Ala., appointed master mechanic at Spencer, N. C.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE MARCH ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road and Builder	*No. of Units*	*Horse-power*	*Service*	*Other Detail*
COLORADO & WYOMING:				
Electro-Motive	1	900	Switching	———
LACKAWANNA:				
Electro-Motive	8	1,200	Yard switch.	Approx. cost, $1,000,000. For delivery in fall.

GAS-TURBINE ELECTRIC LOCOMOTIVE ORDERS

UNION PACIFIC:				
General Electric	15	8,500	Freight	In addition to 15 such units ordered late in 1955. Approx. cost, $15,000,000. Delivery expected to begin early in 1958.

FREIGHT-CAR ORDERS

Road and Builder	*No. of Cars*	*Type of Car*	*Cap., Tons*	*Other Detail*
BANGOR & AROOSTOOK:				
ACF Industries	400	Box	50	50-ft. Approx. cost, $3,750,000. Fifty to be equipped with roller bearings and Nailable Steel flooring.
BURLINGTON:				
Company shops	1,525	Box	50	25 for C&S.
	410	Covered hopper	70	60 for C&S.
	50	Gondola	70	985 cars for delivery next year.
ERIE:				
Greenville Steel Car	100	Covered hopper	70	Cost, $1,125,000. For July delivery.
GULF, MOBILE & OHIO:				
Bethlehem Steel	50	Mill-type gondola	70	For January 1958 delivery.
ACF Industries	10	Tank	—	19,000 gal. For August delivery.
NORFOLK SOUTHERN:				
Bethlehem Steel	25	Hopper	50	In addition to previous order for fifty 50-ton hoppers. Cost, $172,500. Delivery expected this month.
NORTH AMERICAN CAR:				
Pullman-Standard	200	Covered hopper	70	Estimated unit cost of these 275 cars,
ACF Industries	75	Covered hopper	70	$11,000. For delivery Sept.-Nov.
PHILADELPHIA, BETHLEHEM & NEW ENGLAND:				
Bethlehem Steel	30	Gondola	70	Estimated cost, $275,000. Delivery late 1957 or early 1958.
TEXAS & PACIFIC:				
Company shops	75	Box	50	230 cars for construction next year.
	25	Refrigerator	50	
	100	Gondola	70	
	30	Covered hopper	70	
UNION PACIFIC:				
Bethlehem Steel	500	Gondola	70	———
UNION TANK CAR CO.:				
Company shops	800	Tank	—	11,000-gal.
	56	Tank	—	10,600-gal. For delivery this year and
	1	Tank	—	6,000-gal. next year.
	11	Tank	—	4,000-gal.
WABASH:				
Pullman-Standard	4	Covered hopper	70	Immediate delivery.
WILSON CAR LINES:				
Pacific Car & Fdry.	200	Refrigerator	40	Estimated cost, $2,645,000. For fourth quarter delivery.

PASSENGER-CAR ORDERS

Road and Builder	*No. of Cars*	*Type of Car*	*Other Detail*
BURLINGTON:			
Budd Co.	10	Gallery	Air conditioned. Similar to 50 units already in service. For delivery third quarter 1957. Seats for 145.
NORTHERN PACIFIC:			
Budd Co.	6	Dining	Eight cars for "North Coast Limited."
	2	Vista Dome coaches	
SANTA FE:			
Budd Co.	15	Baggage	For January 1958 delivery.

INQUIRIES AND NOTES

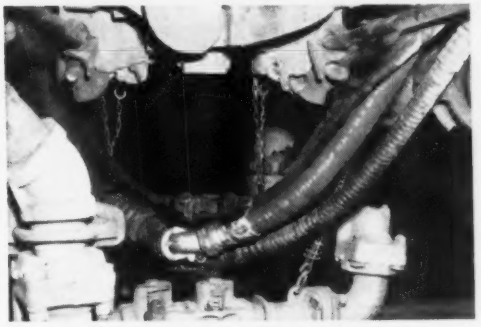
FREIGHT CARS:

Chesapeake & Ohio.—Ordered 100 car sets of box-car doors with aluminum bottom panel from Youngstown Steel Door.

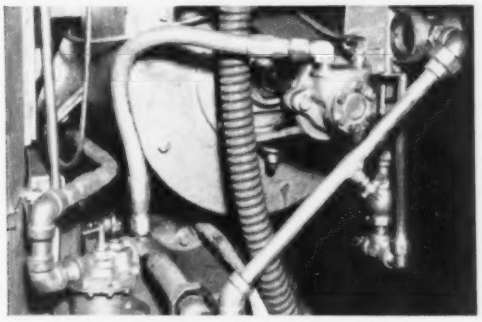
Cotton Belt.—Budgeted $1,440,350 to buy 100 additional hopper cars and 50 pulpwood rack cars for delivery this year.

Rock Island.—Ordered from ACF Industries 10 aluminum refrigerator cargo units for Convert-A-Frate service. Delivered in March.

Northern Pacific diesel-powered locomotives like this use Aeroquip Flexible Hose Lines to minimize downtime and reduce maintenance costs.



A typical Aeroquip Air Brake Hose installation, using 1531 Hose and Reusable Fittings. Replacement lines like these can be assembled and installed quickly.



Aeroquip 1503 Wire Braid Hose and Reusable Fittings make up water and fuel lines on this steam generator.

Northern Pacific Railway Uses Aeroquip Hose Lines

FOR AIR BRAKE, WATER, FUEL AND OIL APPLICATIONS

On-schedule railroad operations call for dependable performance of equipment. Railroads like Northern Pacific minimize downtime and cut maintenance costs by using Aeroquip Flexible Hose Lines for air brake, water, fuel and oil lines.

For example, damaged air brake lines on locomotives and passenger cars are replaced quickly with Aeroquip 1531 Air Brake Hose and Reusable Fittings. Hose lines are made up when needed, in the shop, by cutting bulk hose to length and attaching the Aeroquip Fittings. Bulk hose and reusable fittings reduce inventory, save money.

Get full information on Aeroquip products from the Aeroquip Distributor listed in your Yellow Page Directory. Call him.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Supply Trade Notes

AMERICAN STEEL FOUNDRIES.—*Carl E. Tack*, assistant vice-president of the transportation equipment division, has been appointed chief mechanical engineer of this division.

■

MAGNUS METAL CORPORATION.—*M. A. Hanson* has been appointed chief engineer at Chicago, succeeding *Lawrence L. Neebe*, retired. He was previously engineer of research on the Gulf, Mobile & Ohio. Mr. Hanson began his career in 1928 as assistant chemical engineer on the Alton, which was later consolidated with the GM&O. He was appointed assistant engineer of tests in 1945 and engineer of research in 1948. He is vice-chairman of the AAR Committee on Lubrication of Cars and Locomotives and a registered professional engineer in the State of Illinois.

■

THOR POWER TOOL COMPANY. —*William J. Laughlin*, Los Angeles branch manager, has been appointed industrial division manager at Chicago. *Clarence H. Gabriel*, Denver manager, succeeds Mr. Laughlin at Los Angeles. *Mark A. Sorenson*, Philadelphia manager, succeeds Mr. Gabriel at Denver; *John L. MacDonald*, Newark manager, succeeds Mr. Sorenson at Philadelphia, and *Albert C. Cheswick*, Houston service engineer, succeeds Mr. MacDonald as manager in Newark.

■

HUCK MANUFACTURING COMPANY.—A west coast branch for warehousing and service of blind rivet and lock-bolt type fasteners and related tools has been opened in suburban Englewood, Los Angeles, Cal. *R. A. Villacres* has been named branch manager there.

■

CANADIAN STEEL FOUNDRIES.—An annual production of 1,000,000 wheels is the goal set for the $6,000,000 plant under construction in Montreal for the production of wrought-steel wheels for railroad cars and locomotives. The plant is expected to go into operation late in 1958 or early in 1959.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of December		12 months ended with December	
		1956	1955	1956	1955
3	Road locomotive miles (000) (M-211):				
3—05	Total, steam	3,199	5,398	46,268	65,892
3—06	Total, Diesel-electric	37,261	37,206	446,683	427,601
3—07	Total, electric	694	700	8,690	8,966
3—04	Total, locomotive-miles	41,420	43,547	504,680	505,128
4	Car-miles (000,000) (M-211):				
4—03	Loaded, total	1,633	1,663	20,237	20,099
4—06	Empty, total	987	972	11,343	11,054
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6—01	Total in coal-burning steam locomotive trains	8,376	12,159	115,652	151,724
6—02	Total in oil-burning steam locomotive trains	614	1,822	14,526	26,254
6—03	Total in Diesel-electric locomotive trains	107,546	102,837	1,290,337	1,209,703
6—04	Total in electric locomotive trains	2,130	2,025	27,021	27,086
6—06	Total in all trains	119,605	119,652	1,458,204	1,423,551
10	Averages per train-mile (excluding light trains) (M-211):				
10—01	Locomotive-miles (principal and helper)	1.02	1.02	1.03	1.02
10—02	Loaded freight car-miles	42.3	42.1	43.0	42.7
10—03	Empty freight car-miles	25.5	24.0	24.1	23.5
10—04	Total freight car-miles (excluding caboose)	67.8	65.0	67.1	66.2
10—05	Gross ton-miles (excluding locomotive and tender)	3,094	2,951	3,100	3,026
10—06	Net ton-miles	1,400	1,323	1,420	1,374
12	Net ton-miles per loaded car-mile (M-211)	33.1	32.3	33.9	32.1
13	Car-mile ratios (M-211):				
13—03	Per cent loaded of total freight car-miles	62.3	63.1	64.1	64.5
14	Averages per train hour (M-211):				
14—01	Train miles	19.1	18.6	18.6	18.6
14—02	Gross ton-miles (excluding locomotive and tender)	58,300	54,322	57,012	55,770
14	Car-miles per freight car day (M-240):				
14—01	Serviceable	45.8	46.1	46.8	46.9
14—02	All	44.2	44.3	45.0	44.5
15	Average net ton-miles per freight car-day (M-240)	913	902	953	922
17	Per cent of home cars of total freight cars on the line (M-240)	43.8	41.7	41.8	44.9

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3—05	Steam	537	1,379	8,394	16,503
3—06	Diesel-electric	21,010	21,461	243,142	243,516
3—07	Electric	1,323	1,399	14,969	15,672
3—04	Total	22,874	24,240	266,510	275,698
4	Passenger-train car-miles (000):				
4—08	Total in all locomotive-propelled trains	247,098	259,332	2,766,315	2,832,589
4—09	Total in coal-burning steam locomotive trains	3,670	8,814	52,747	95,680
4—10	Total in oil-burning steam locomotive trains	1,213	3,884	15,973	48,464
4—11	Total in Diesel-electric locomotive trains	225,917	230,159	2,517,888	2,507,416
12	Total car-miles per train-mile	10.36	10.33	9.93	9.87

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours:				
1—01	Steam, coal-burning	197,121	292,516	2,744,966	3,469,679
1—01	Steam, oilburning	17,379	41,090	348,251	577,982
1—03	Diesel-electric[1]	3,876,473	3,905,163	45,819,549	44,201,396
1—06	Total	4,093,962	4,242,619	48,955,993	48,321,569
2	Passenger yard switching hours:				
2—01	Steam, coal-burning	4,875	7,981	67,011	99,621
2—02	Steam, oil-burning	2,233	4,600	37,437	62,822
2—03	Diesel-electric[1]	268,341	270,696	2,982,564	2,947,845
2—06	Total	302,492	311,376	3,385,832	3,422,356
3	Hours per yard locomotive-day:				
3—01	Steam	6.5	6.4	6.4	5.9
3—02	Diesel-electric	15.6	16.2	15.7	15.7
3—05	Serviceable	15.6	15.9	15.7	15.5
3—06	All locomotives (serviceable, unserviceable and stored)	14.5	14.4	14.4	13.8
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.72	1.76	1.68	1.67
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.75	.74	.75	.75

[1] Excludes B and trailing A units.

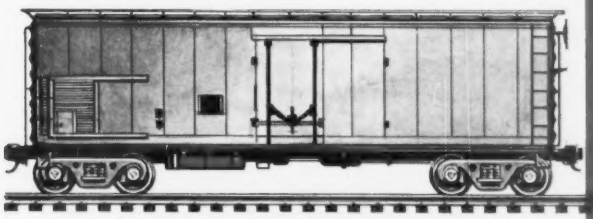
C. E. Tack

M. A. Hanson

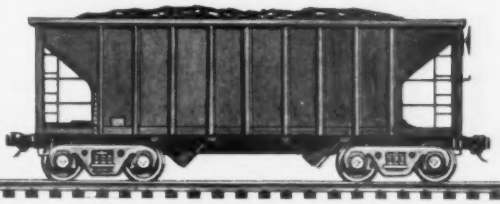
W. J. Laughlin

R. A. Villacres

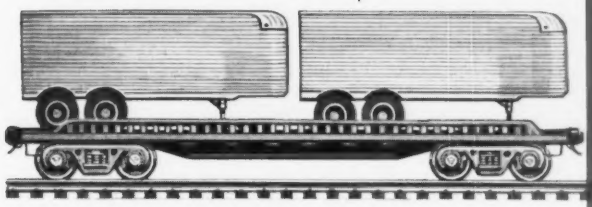
38 LEADING LINES NOW HAVE IN SERVICE OR ON ORDER 9313* CARS WITH DEPENDABLE HYATTS ... including:



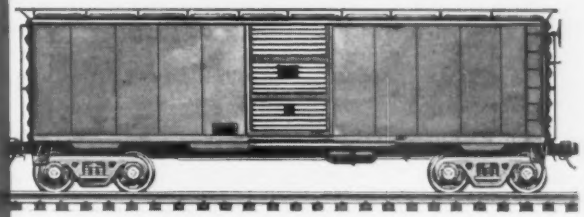
2385* refrigerator cars



1929* ore cars and covered hoppers



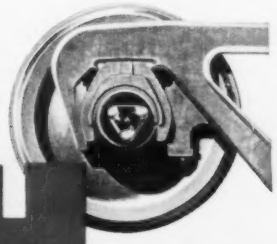
728* T.O.F.C. cars



1304* box cars

*latest available figures at press time

Watch "WIDE WIDE WORLD"
Sundays on NBC-TV



Already more than *100 million freight car-miles* have proved the dependability of HYATT'S long-lived straight cylindrical roller design. No wonder more and more railroads are switching to HYATT Hy-Rolls! They have fewer parts than other roller bearings. They need no fitting adjustments, and can be *completely* dismantled for inspection. Races are forged of finest high-nickel steel for longer wear. Hy-Rolls take only ten ounces of grease every three years. Low-cost, *low-upkeep* HYATT Hy-Rolls are your best buy for the long haul! Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.

Another GM GENERAL MOTORS contribution to railroad prosperity

HYATT HY-ROLL BEARINGS
FOR NON-STOP FREIGHT

In DIESEL CLEANING, too

Oakite gives you

low-cost end results

RESULTS TALK! So if you're after genuine savings in diesel cleaning check the *results* Oakite delivers.

Take for example, the cleaning of diesel interiors. One Class 1 Road had been using an alleged "low-cost-per-pound" material for this critical job. Then they tried Oakite Composition No. 72—costing peanuts more per pound. Here are the *end results:*

In one month—washing 300 diesels—Road cut their cleaner poundage from 1200 lbs. to 337 lbs. They cut their monthly cleaner cost from $144.00 to $57.63. And they got better cleaning, better rinsing.

Another Road, using this same Oakite 72 for washing diesel exteriors, saves over $800.00 a month. They use 5.6 gallons at 2 oz/gal. as against 20 gallons at 6 oz/gal. per diesel. These figures speak for themselves. Results tell the true story.

Booklet F-8055 describes the many specialized Oakite materials and methods that guarantee economical railroad maintenance cleaning. Send for your copy to Oakite Products, Inc., 46 Rector Street, New York 6, New York.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIAL · SERVICE · SCIENCE

gives you the important advantage . . .
LOW-COST END RESULTS

Export Division
Cable Address: Oakite

RAILROAD DIVISION

SUPPLY TRADE NOTES

(Continued from page 16)

AMP INCORPORATED.—Two new regional offices have been established at Wayne, Pa., and at Dallas, Tex., in charge of *Robert V. Tate* and *James E. Miller,* respectively. Mr. Tate was previously district sales engineer; Mr. Miller, district sales engineer at Rochester, N. Y.

■

GOULD - NATIONAL BATTERIES, INC.—*George R. Powers, Jr.,* has been appointed St. Louis regional manager of the Industrial Division.

■

AIR REDUCTION SALES COMPANY.—*H. C. Wallace,* district manager at Louisville, Ky., has been appointed assistant regional sales manager, Southern region, with headquarters in Louisville. *A. C. Pease,* assistant sales manager, succeeds Mr. Wallace as district manager.

■

O. Bergman

WESTINGHOUSE AIR BRAKE COMPANY.—*Oscar Bergman* has been appointed southeastern district engineer, with headquarters in Washington, D. C. *W. V. Steele* succeeds Mr. Bergman as representative in the southeastern district.

■

LINDE AIR PRODUCTS COMPANY. —*H. T. Ross* has been appointed vice-president-engineering.

■

MILLER LUBRICATOR COMPANY. —*Harry Lock* has been appointed a sales representative, with headquarters at 3908 Scadlock Lane, Sherman Oaks, Los Angeles, Calif.

■

GENERAL AMERICAN TRANSPORTATION COMPANY. — *Stuart H. Moyes,* supervisor of engineering department, car maintenance division, has been appointed chief engineer of the freightcar designing division, succeeding Fred Garlock, retired.

Obituary

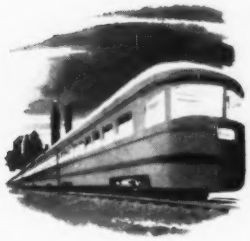
CHARLES E. BASCOM, president and chairman of the board of the Broderick & Bascom Rope Co., died on December 27.

The world of science behind
EXIDE-IRONCLAD BATTERIES

Being interviewed is H. A. Fuggiti, Acting Senior Development Engineer

"Here's where the heavy slugs of power come from"

At the Exide Laboratories—**Reporter:** Just exactly what part of the battery is that, Mr. Fuggiti?



Fuggiti: This is the Exide-Ironclad positive plate. And in any battery, power reserve is governed by positive plate area.

Reporter: Then do you mean that Exide-Ironclad Batteries have *more* positive plate area?

Fuggiti: Exactly. You can see that here. The cylindrical power tubes are arranged in a row. So the semicircular sides give an effective plate area one-third more than the plate size.

Reporter: How does that increase power reserve?

Fuggiti: Because there's a bigger working surface of battery plate exposed to the electrolyte. Power response is faster.

Reporter: What does this mean in battery performance?

Fuggiti: It means the battery can provide power to spare for peak power loads as well as a dependable source for continuous loads.

Reporter: Obviously this is an important feature of the Exide-Ironclad Batteries.

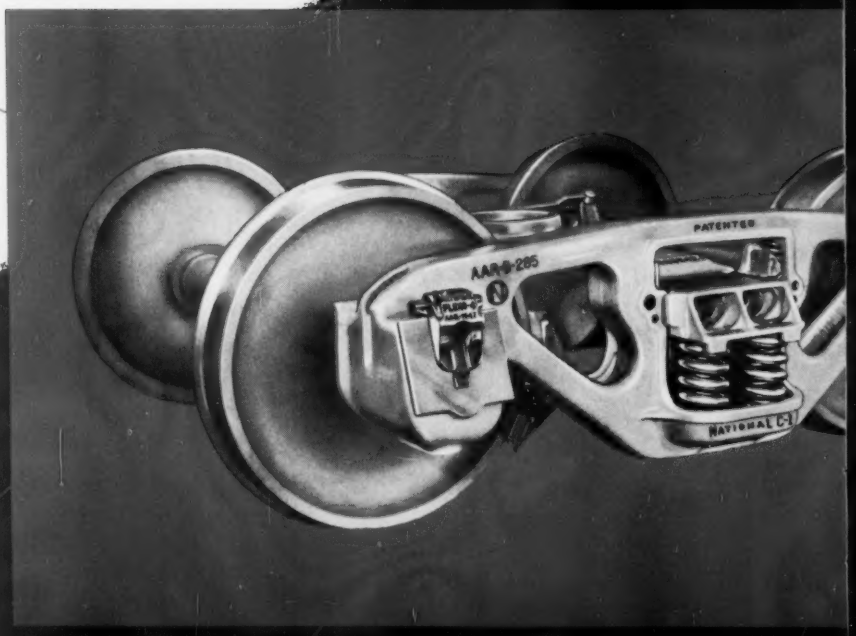
Fuggiti: Yes it is, but it's just one of many engineering details that contribute to their long life and high capacity.

Note to battery users: Whenever you order heavy duty batteries or the equipment that requires them, be sure to specify Exide-Ironclad. For detailed bulletin, write Exide Industrial Division, The Electric Storage Battery Co., Philadelphia 2, Pa.

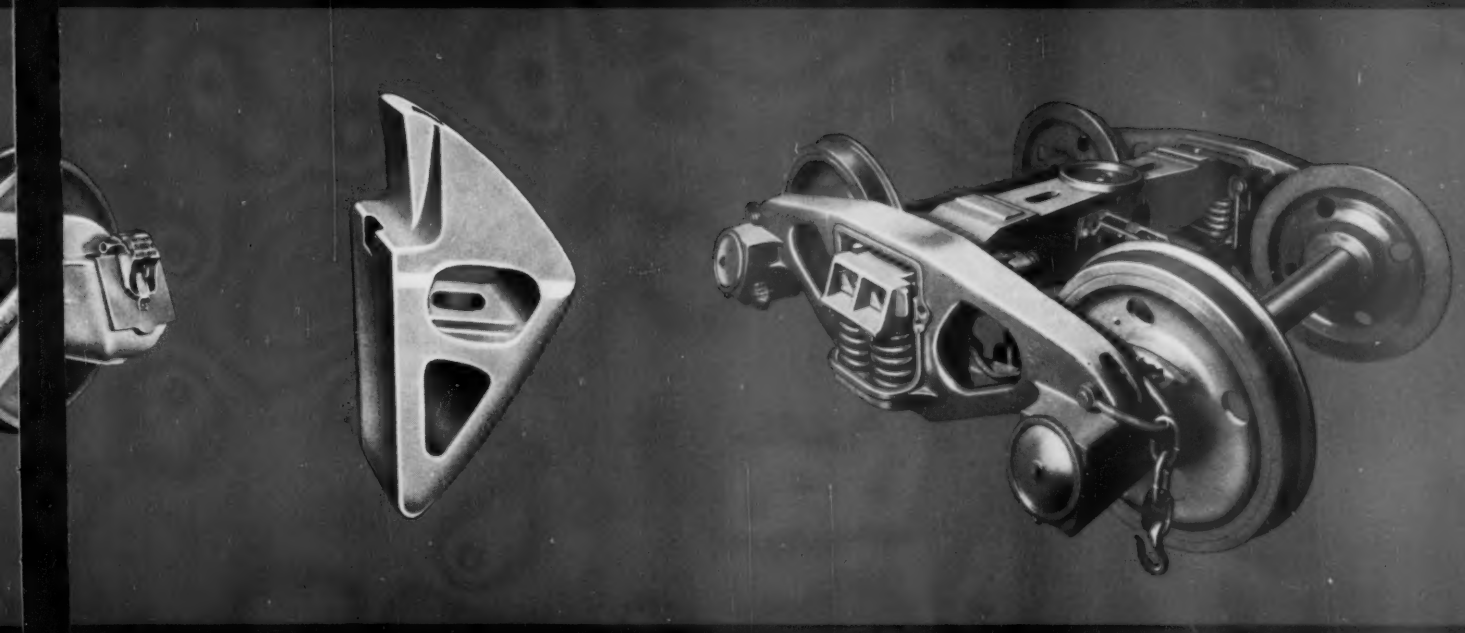
THE ELECTRIC STORAGE BATTERY COMPANY **Exide**®

There's Improved Railroading Around the World with National Specialties

EXAMPLE:



C-1 TRUCKS



The sun never sets on National C-1 trucks. They are used by major railroads in many countries because C-1 Trucks provide a s-m-o-o-t-h, friction-controlled ride that results in lower maintenance for cars and trucks.

Heart of the C-1 friction-control mechanism is the wedge. Actual service records prove that C-1 wedges are still in top condition . . . even after travelling the equivalent of eight times around the world.

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Railway Division Headquarters
Cleveland 6, Ohio

International Division Headquarters
Cleveland 6, Ohio

Established 1868

Canadian Subsidiary: National Malleable and Steel Castings Company of Canada, Ltd., Toronto 1, Ontario
Sales Representatives: The Holden Co., Ltd., Montreal 3, Quebec

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • SNUBBER PACKAGES • JOURNAL BOXES

GEARED TO PROGRESS P R I MEMBER

Speer Brushes always make the grade....

Generator Brush
Speer Grade E44 Multiflex®

Traction Motor Brush
Speer Grade 6758 Multiflex®

with long life...outstanding performance

For the long haul, you will find that Speer brushes are service-designed to give you even wear, reduced vibration . . . improved commutation, longer service life.

Here are two Speer brushes that are especially designed for use on mainline locomotives:

Generator Brush (left above)
Speer's grade E44 Multiflex brush is a tough, dense grade developed specifically to give long, maintenance-free service on diesel-electric locomotive main generators.

Traction Motor Brush (right above)
Speer's grade 6758 Multiflex brush is a strong, dense, high, contact-drop grade for diesel-electric locomotive traction motors. Two independent sections give it all the advantages of a double brush—yet it operates in a single holder.

Speer offers a complete range of brushes. Every Speer brush is designed to give long, sturdy use under rugged operating conditions. Whether you maintain industrial motive units or higher hp diesel-electric locomotives, there's a Speer brush *made especially* for your equipment. Write today for full information.

If you have not received your free copy of our catalog, BRUSHES BY SPEER, send for it today.

SPEER *Carbon Co.*
St. Marys, Pa.

Name the load on your road

Diesel switch engine is safely and easily lifted with four M-1-AB Yellow Strand Braided Slings; each sling is 8 parts ¾" rope, 14 feet long.

there's a Yellow Strand® Safety Sling to handle it!

Any load you have to handle is a load for Yellow Strand Braided Safety Slings.

Yellow Strand Braided Safety Slings are strong, flexible, easy to attach. Special braiding methods keep safety factors high. High-quality Yellow Strand Wire Rope assures longer life.

They can be tailor-made to specifically fit your needs. Just ask your Broderick & Bascom distributor, or write direct to us for specific sling information.

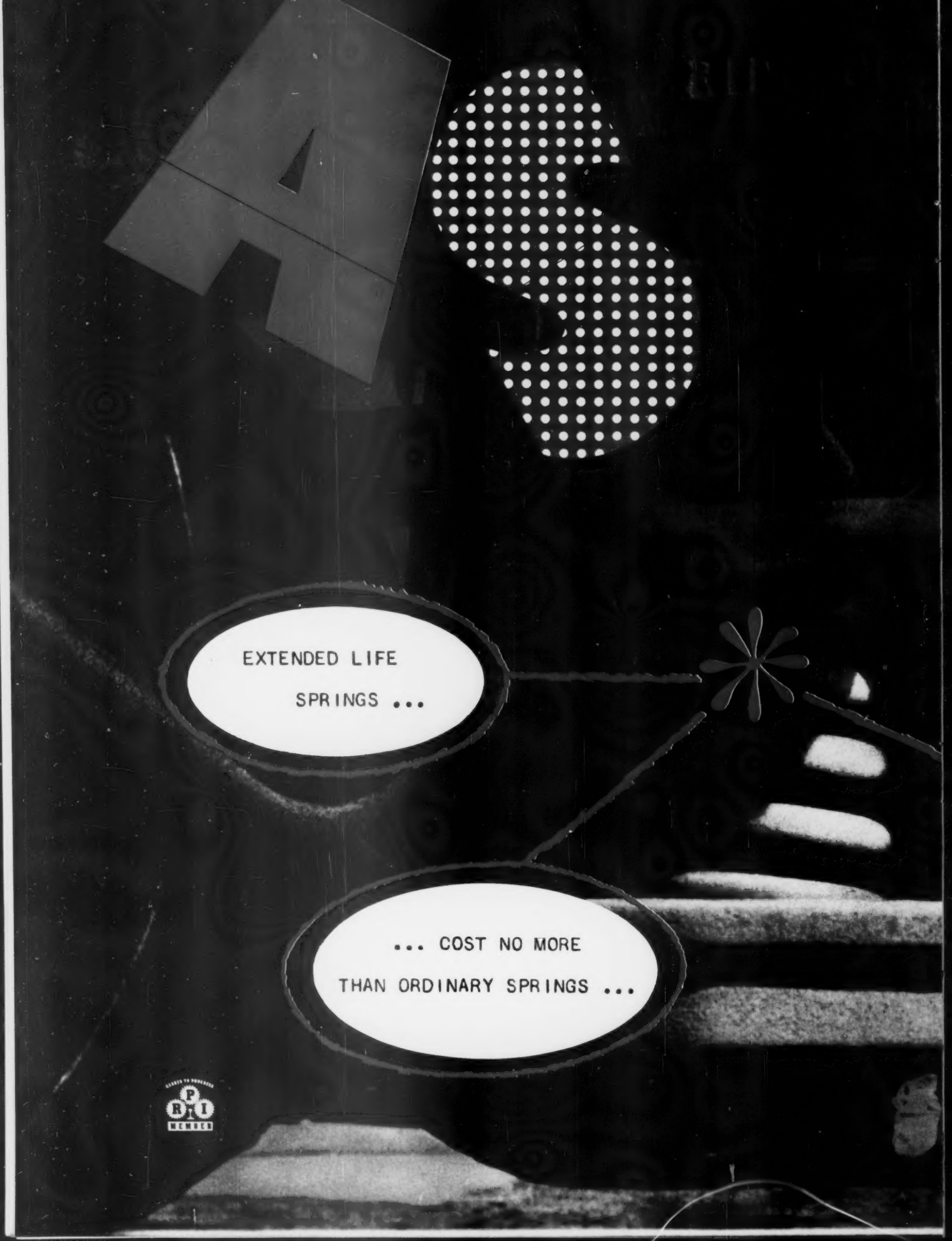
Yellow Strand®

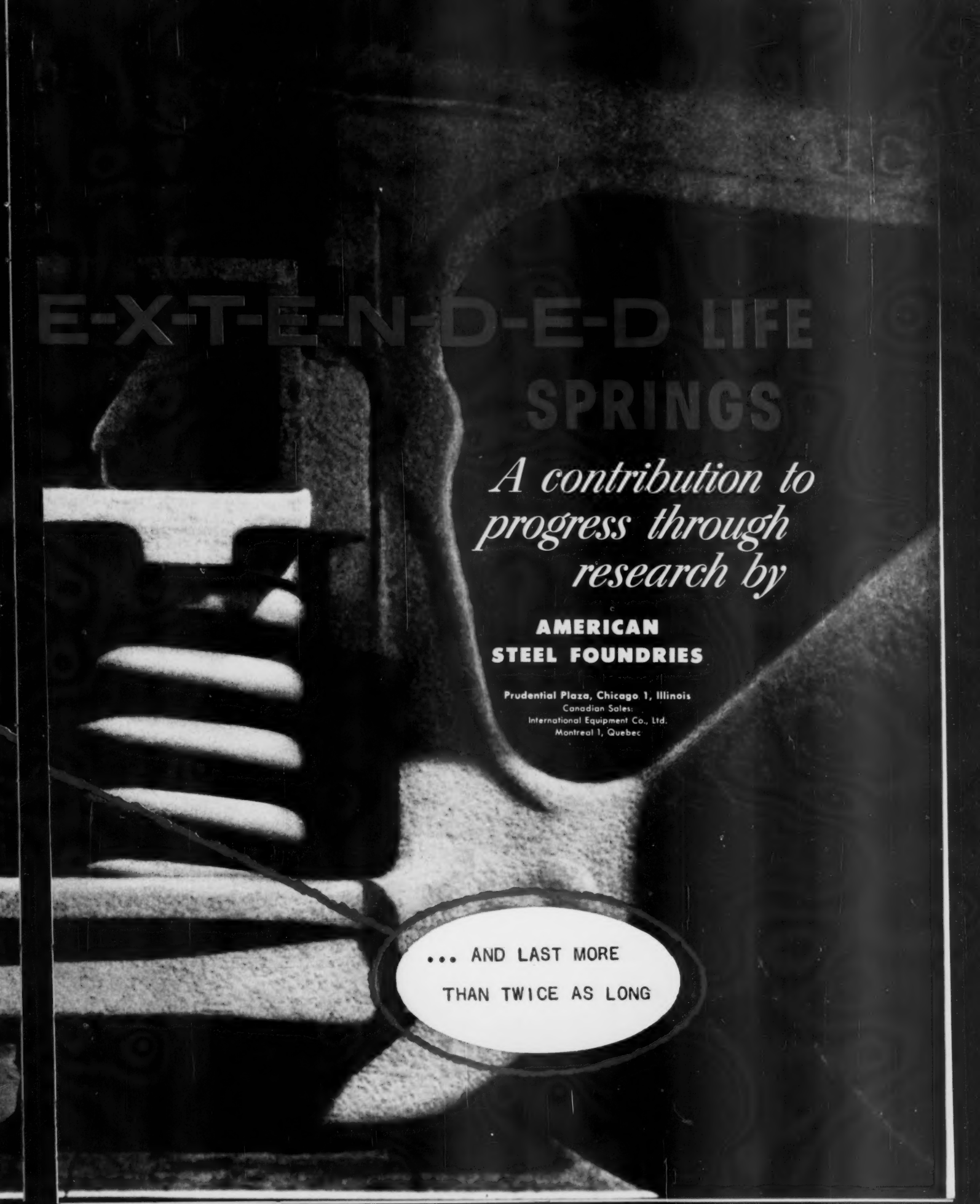
Manufacturers of Wire Rope for over 80 Years

Broderick & Bascom Rope Co.

4203 Union Blvd., St. Louis 15, Mo.

American Logging Tool Corporation is a subsidiary of Broderick & Bascom Rope Co.


A
EXTENDED LIFE
SPRINGS ...
... COST NO MORE
THAN ORDINARY SPRINGS ...
P
R I
MEMBER


E-X-T-E-N-D-E-D LIFE
SPRINGS
A contribution to progress through research by
AMERICAN
STEEL FOUNDRIES
Prudential Plaza, Chicago 1, Illinois
Canadian Sales:
International Equipment Co., Ltd.
Montreal 1, Quebec
... AND LAST MORE
THAN TWICE AS LONG

Answers to

about Kaiser Aluminum's purchase of

As part of its continuing growth program, Kaiser Aluminum & Chemical Corporation recently purchased the Wire and Cable Division of United States Rubber Co., located at Bristol, Rhode Island. The purchase raises a number of questions that are of direct interest to customers of both Kaiser Aluminum and the former Wire and Cable Division of U. S. Rubber. Here are the answers to those questions.

Q. Will all of the U.S. Rubber products still be available?

A. Yes, ALL of the wire and cable products formerly offered by U.S. Rubber will continue to be produced and sold—without changes of any kind.

Q. Who will back up the U.S. Rubber guarantees now? What about replacement?

A. Kaiser Aluminum will guarantee all U.S. Rubber Wire and Cable Division products now in use on the same terms as originally established, including replacement. Former U.S. Rubber products (which will continue to be offered) will carry the same guarantees as before.

Q. I have always liked the way U.S. Rubber people have served my needs; who will be doing the job now?

A. The same people who served you before will serve you now. The purchase includes acquisition of Wire and Cable Division's nationwide sales organization, as well as the plant work force of 1200 people.

Q. Will the price structure remain the same?

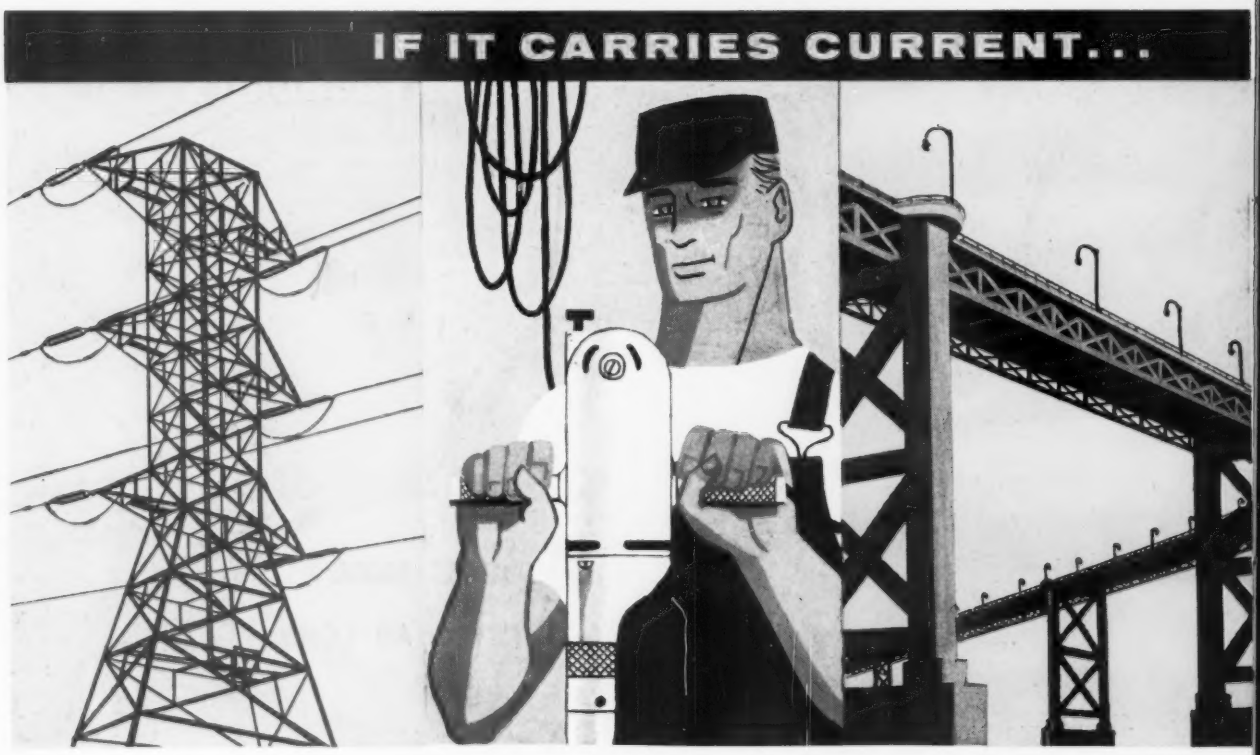
A. There will be no change in price structure as a result of the purchase. Kaiser Aluminum will continue to be a leader in maintaining a stable price structure throughout the market.

Q. Can I now buy both aluminum and copper electrical conductor from Kaiser Aluminum?

A. Yes—and in a wider variety than formerly available from either source. One of the primary effects of the purchase is to broaden the product range offered by Kaiser Aluminum in both aluminum and copper conductors.

Q. How about the insulations used in U.S. Rubber products: will the quality still be the same?

A. These high-quality insulations will remain exactly the same in every specification detail. In fact, they will be *supplied* by U.S. Rubber. Continued research cooperation will exist between the U.S. Rubber scientists and engineers and Kaiser Aluminum.



your questions

U. S. Rubber Wire and Cable Division

Q. Will new people from both companies be calling on me?

A. There will be no duplication of calls, because former U.S. Rubber personnel will be prepared to present the entire, broadened product line to those customers who can benefit by it. Occasionally, Kaiser Aluminum specialists will accompany the former U.S. Rubber representatives to help present the complete line. Conversely, Kaiser Aluminum Sales Representatives will be prepared to present the new, complete line to their established customers, assisted by former U.S. Rubber specialists.

Q. I formerly bought through a Kaiser Aluminum or U.S. Rubber distributor outlet. How will this be changed?

A. The distributor who formerly carried U.S. Rubber wire and cable will continue to offer the same products with no change. Present Kaiser Aluminum Distributor outlets also will remain unchanged.

Q. Will there be any effect on the Field Engineering Services formerly available through either company?

A. The technical assistance available to you will be greatly increased. Kaiser Aluminum—as the nation's largest producer of covered aluminum wire—is already a leader in research and product development, both in the laboratory and in the field. Now, by acquiring additional highly skilled technical personnel, these services will be further strengthened.

Q. How will the new setup affect my delivery date?

A. The convenience of a new eastern plant location, plus additional sales representatives and distributors, will mean even faster and more efficient service.

* * *

The purchase of the Wire and Cable Division of United States Rubber puts into operation the twenty-third plant for Kaiser Aluminum, which started with three plants just ten years ago.

This growth is based on the continued support of our customers, who, working with us, have helped to make Kaiser Aluminum the nation's fastest-growing major producer of aluminum. This latest acquisition represents another step forward in our program of complete service to the nation's rapidly-expanding electrical industry.

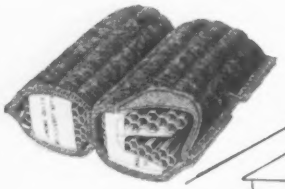
Kaiser Aluminum & Chemical Sales, Inc., *Executive Office*, Kaiser Bldg., Oakland 12, California; *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois.

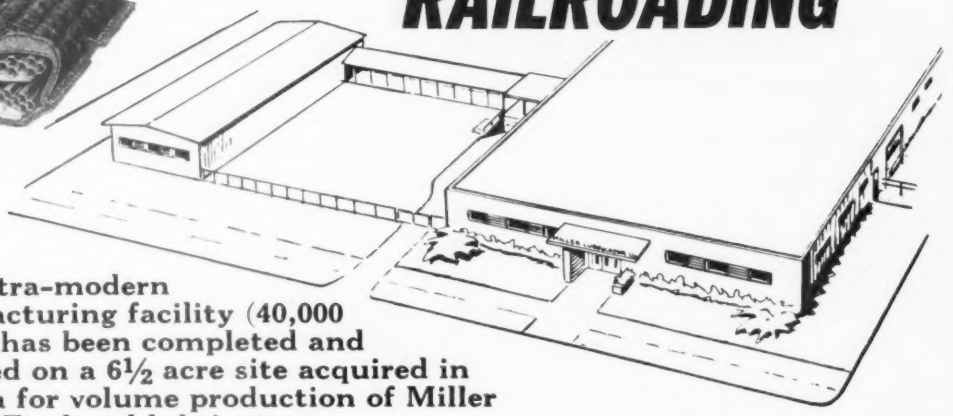
Kaiser Aluminum

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

78,000 CARSETS TO DATE

FOR PROGRESSIVE RAILROADING





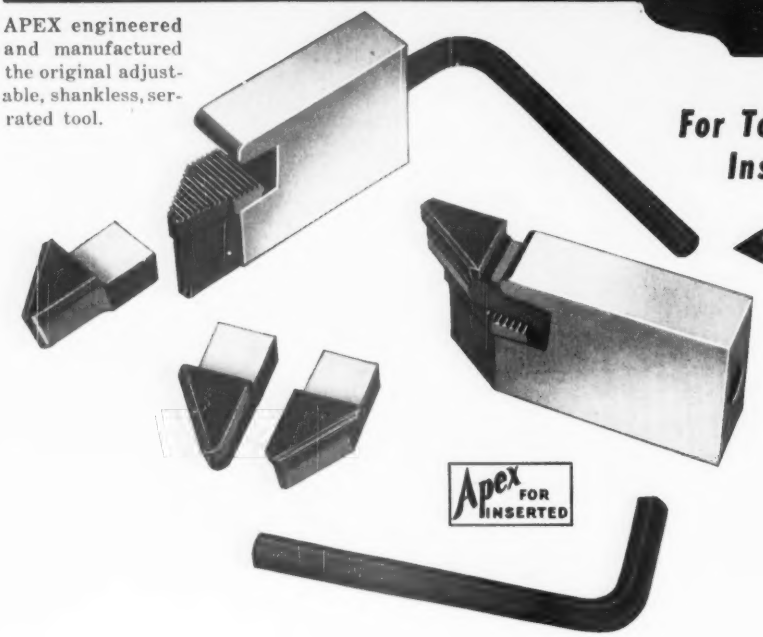
This ultra-modern manufacturing facility (40,000 sq. ft.) has been completed and occupied on a 6½ acre site acquired in Winona for volume production of Miller Center Feed pad lubricators.
Additional capacity, regardless of amount, to meet every Railroad requirement will be installed promptly when needed. 30,000 sq. ft. will be added early 1957.

- *Volume quantities—immediate delivery*
- *Cost—$40 per carset (for all sizes)*
- *Life expectancy—6 years*

MILLER LUBRICATOR CO., WINONA, MINN.

PRODUCTION TOOLS by APEX

APEX engineered and manufactured the original adjustable, shankless, serrated tool.



For Tooling Economy Use APEX Inserted Tools For Axles

•

← HOLDERS AND TOOLS for "SELLERS" AXLE LATHE

We manufacture holders and forged inserted tools for roughing and finishing axles and wheels. Form tools to your specifications. Send for book on APEX tooling for railroad work, or the the APEX catalog. Our engineers are always ready to help you with tooling problems.

THE APEX TOOL & CUTTER CO., SHELTON 22, CONN.

LOW COST MODERNIZATION
FOR CARS OF ALL CAPACITIES..

NEW

C-R®

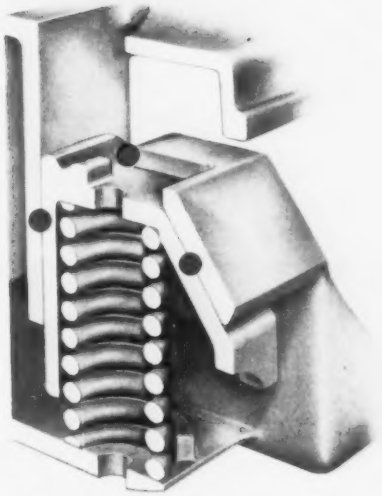
(Cushion-Ride)

PACKAGE UNIT

Applicable to *all* previously built, non-friction control trucks. Available with 2-1/2" or 3-1/16" spring travel.

ENGINEERED and BUILT BY

Buckeye

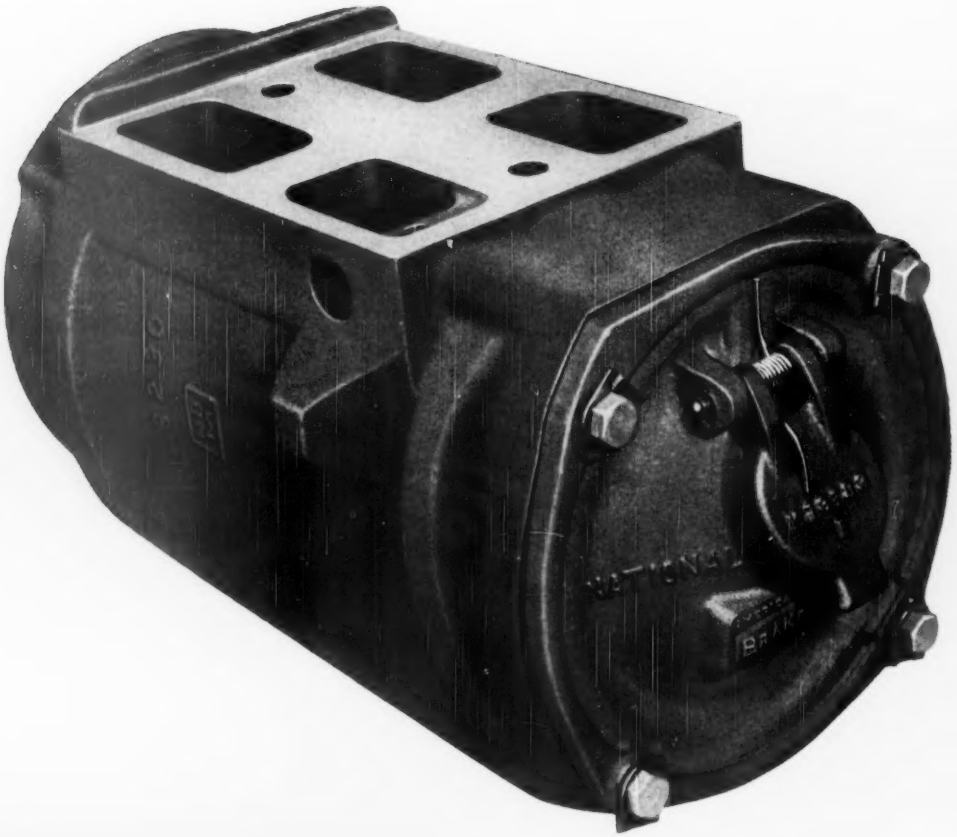


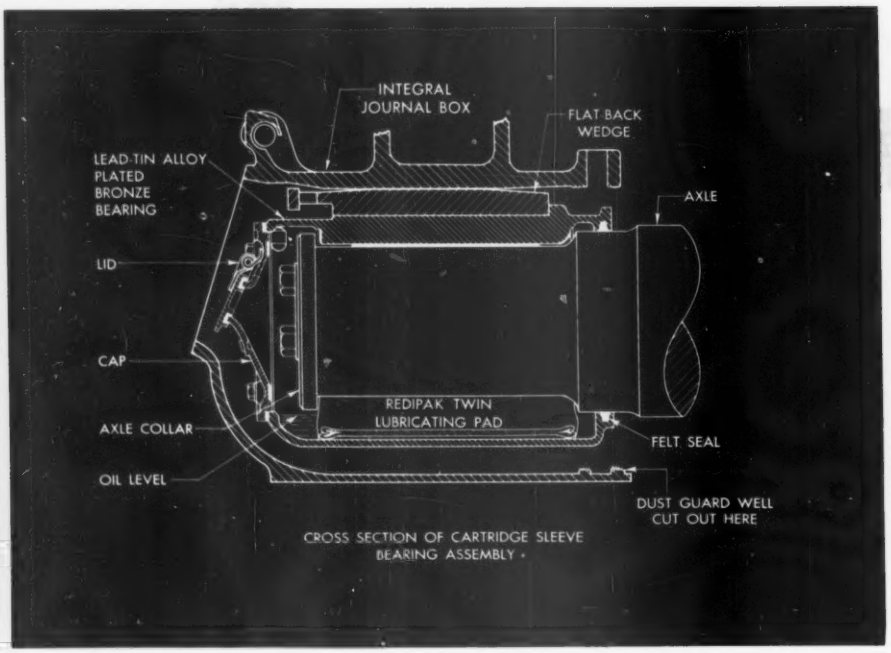
CUTAWAY OF THE BUCKEYE C-R PACKAGE UNIT SHOWING THE FEATURED MAXIMUM FRICTION BEARING SURFACES.

FOR COMPLETE INFORMATION..CALL OR WRITE
Refer Adv. 11880

Ask for Bulletin No 204

The Buckeye Steel Castings Co.
COLUMBUS, O.
NEW YORK, N.Y.
CHICAGO, ILL.
ST. PAUL, MINN.





CROSS SECTION OF CARTRIDGE SLEEVE BEARING ASSEMBLY

The cartridge bearing completely encircles the journal. The journal collar is machined off to permit assembly, and a separate collar is secured with cap screws. The cartridge unit is cast of high strength bronze and plated with a heavy-duty lead-tin alloy. It contains its own lubricating system and is effectively sealed by a lubricated felt ring riding on the conventional dust guard diameter. The Redipak twin lubricating pad is installed when the cartridge is applied to the axle. Oil is contained in the cartridge, not in the box. The usual journal box lid is not needed.

Here Comes the New National Cartridge Bearing!

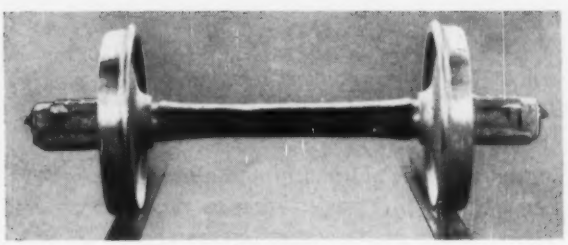
Road service has demonstrated that this economical sleeve bearing stands up under today's toughest freight car service

This revolutionary new concept in journal bearing design—now being road tested—may well become the freight car bearing of the future. The National Cartridge Bearing is a complete, sealed bearing and lubricating system. It neatly fits a standard journal box after the dust guard well has been cut out. The bearing completely encircles the journal—so it cannot lift or shift—and contains its own oil reservoir, Redipak® twin lubricating pad, cover and seal.

Here are a few of the principal advantages offered by the cartridge bearing unit: It stands up to greater impact and braking forces than do roller bearings. It requires very little maintenance—just an infrequent check of oil level and occasional replenishment of oil supply. It assures longer life—no measurable wear on either bearings or journals in over a year's accelerated road service. It minimizes the chances of hot boxes. And finally, it provides savings in initial costs when compared to roller bearings . . . savings in installation and replacement costs . . . and savings in removal costs when a wheel change is needed.

Present service tests on three roads have proven excellent and are validating our laboratory findings. Approved by AAR for test in interchange service.

A-4682

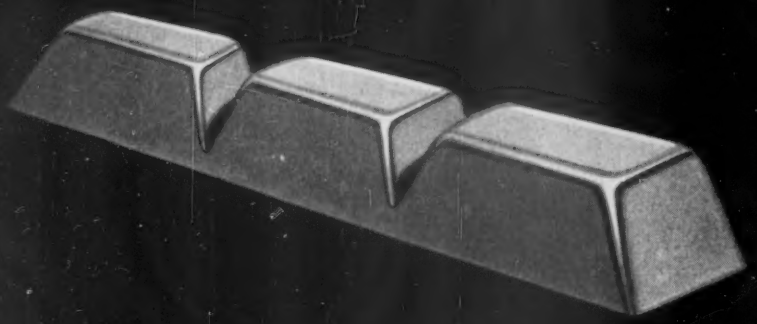


Wheel, axle and cartridge sets are made up in advance for assembly into trucks. No bearing work is done on the rip track.

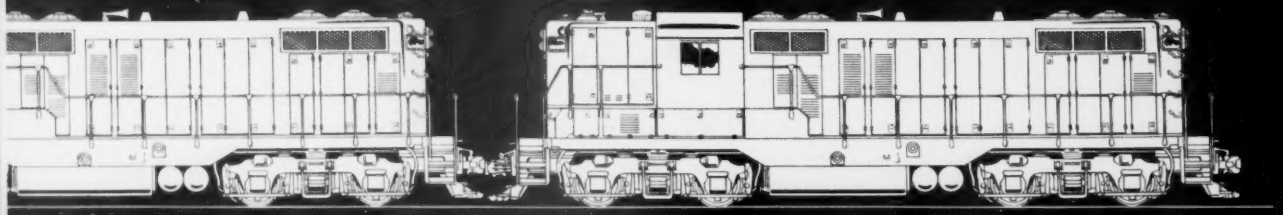
AMERICAN
Brake Shoe
COMPANY

Railroad Products Division
230 PARK AVENUE • NEW YORK 17, N. Y.

Forecast: Aluminum Consumption



1957



Will your present motive power

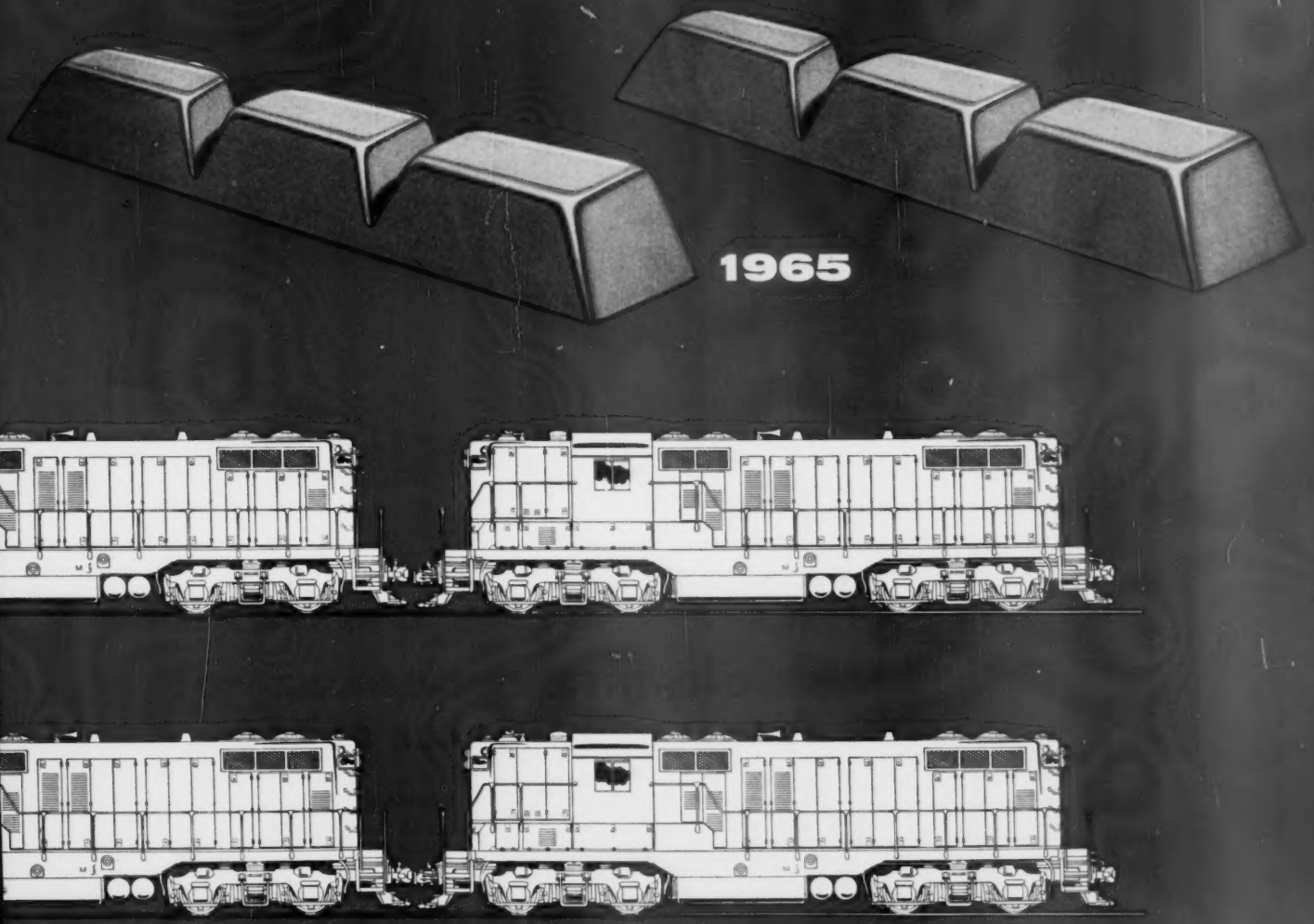
Now is the time to plan for increased traffic, not only for aluminum and aluminum products, but for steel, chemicals, foodstuffs and nearly all other basic products, most of which will exert comparable demands on rail transportation in the growth years ahead.

Electro-Motive is showing its faith in this growth potential through a forty-two per cent expansion of manufacturing facilities. We are now in a better position than ever to plan with you a realistic program of motive-power acquisition and modernization that will *give you power when you need it.*

Through a planned, step-by-step program you will be able to match power to growth conditions as they occur, thus avoid delays costly both in revenue and goodwill.

And Electro-Motive offers the opportunity of anticipating this increasing traffic

*to double by 1965**



* Aluminum producers expect the use of aluminum in such things as buildings, freight cars, automobiles, packages, cans and other new products will double consumption in the United States by 1965.

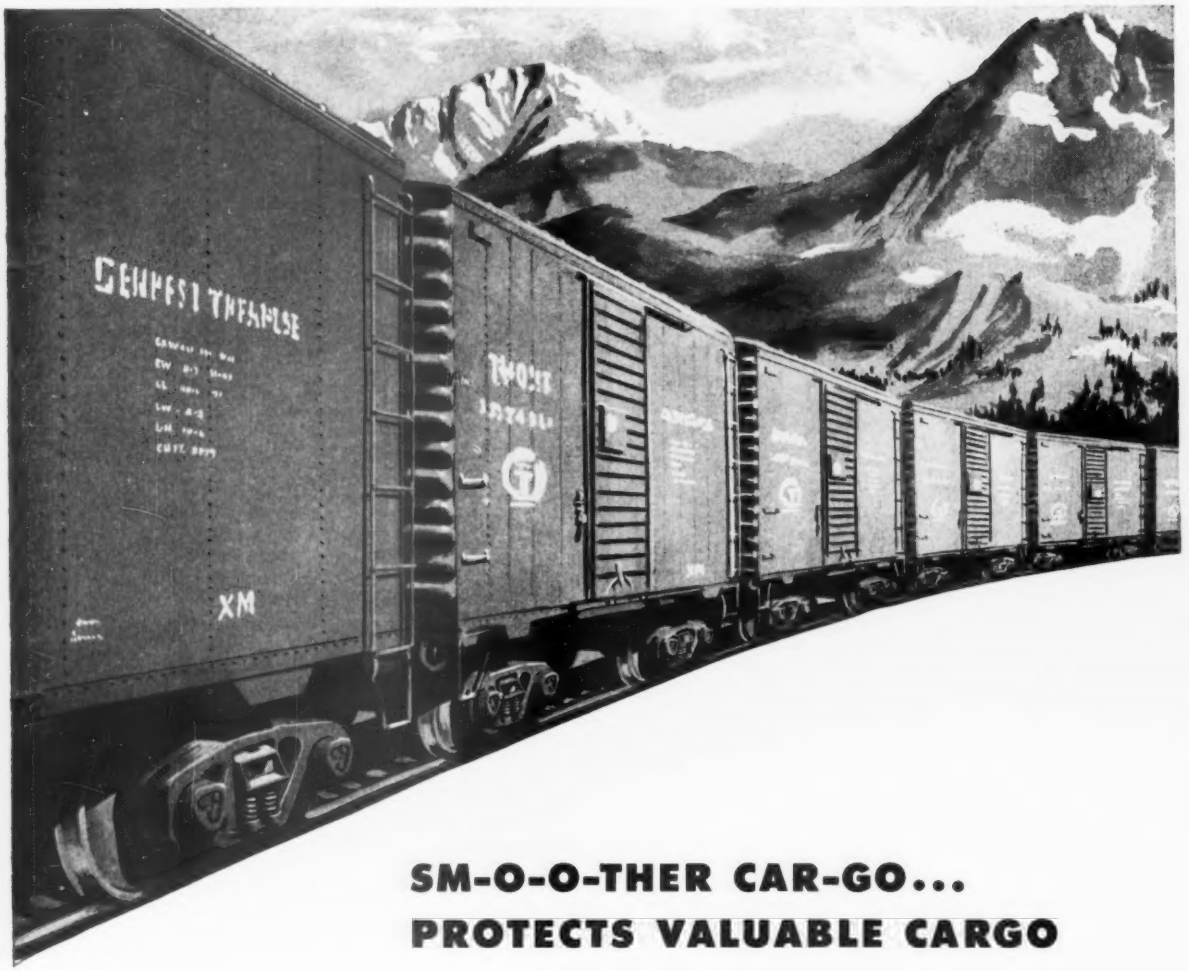
do the job ?

with fast, dependable, economical motive power—either from our constantly improving line of General Motors locomotives, or through our modernization facilities that make new locomotives from old.

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS

La Grange, Illinois • Home of the Diesel locomotive
In Canada: General Motors Diesel, Ltd., London, Ontario



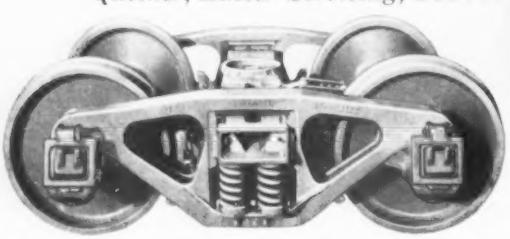
SM-O-O-THER CAR-GO...
PROTECTS VALUABLE CARGO

Higher speeds! Tighter schedules! These combine to give equipment and ladings many opportunities to become damaged. Damage claims are a serious problem for any road.

Barber Stabilized Trucks give smoother rides, maximum protection. Destructive forces are self-dampened through the coordinated action of Barber Stabilizer components. Actuating springs, friction shoes and special wear plates . . . arranged in a unique and ever-ready suspension system . . . guard against vertical shocks and bouncing, increase their frictional resistance on the downward stroke. Over-solid spring blows are eliminated!

Two bargains in one! Barber Stabilized Trucks save your ladings; save your equipment.

Quicker, Easier Servicing, Too . . .



BARBER

STABILIZED TRUCKS

Standard Car Truck Company, 332 S. Michigan Ave., Chicago 4, Illinois. *In Canada:* Consolidated Equipment Co., Ltd., Montreal 2.

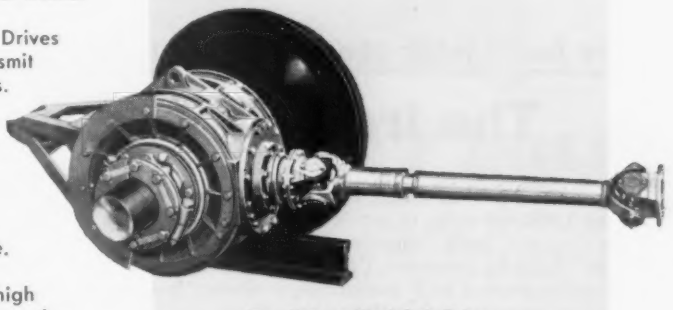
Budd uses the Spicer Drive for swift, economical Rail Car service

Budd Rail Diesel Cars are being adopted in ever-increasing numbers throughout the world because of their proved ability to reduce costs, improve service and attract traffic.

These Budd cars are equipped with two Spicer Drives that mount directly on the axles, and transmit power from the diesel engines to the wheels.

The Spicer Drive is a self-contained unit employing ground spiral bevel gears, with all wearing parts running in a constant bath of oil, completely sealed and protected from ballast, dirt, water, snow, etc., for long life and freedom from maintenance.

This unit incorporates the same features of high efficiency, economy, safety, quietness, and smoothness associated with over 12,000 Spicer positive generator drives in use on railway Pullman coaches, diners, and other rolling stock throughout America.



The Spicer Model 8 Drive as used in Budd Rail Diesel Cars.

Spicer

DANA CORPORATION

TOLEDO 1, OHIO

SPICER PRODUCTS: Transmissions • Universal Joints • Propeller Shafts • Axles • Torque Converters • Gear Boxes • Power Take-Offs • Power Take-Off Joints • Rail Car Drives • Railway Generator Drives • Stampings • Spicer and Auburn Clutches • Parish Frames • Spicer Frames

New train is sleek . . . low . . . light. Jet Rocket highballs along Rock Island's tracks. Gleaming stainless steel body and strong USS T-1 alloy steel underframe both contain nickel and contribute to a safer and lighter, modern train.

Cars built with steels containing nickel

The iron horse gets its second wind

It's here! The proven Talgo, backed by over 1,000,000 miles of service in Spain . . . it's Rock Island's "Jet Rocket." Built by American Car and Foundry Division of ACF Industries, its design promises to revolutionize American railroad passenger travel.

Nickel has a vital part in this. The modern Jet Rocket costs less to build, and its light weight, low center of gravity and speed mean it costs less to run and maintain.

The Jet Rocket, like most other new lightweight trains, is sheathed in gleaming stainless steel. For with nickel this alloy is strong, tough and corrosion resistant. Cars can carry more pay load per square foot and always look clean.

Nickel is also an essential alloying element in the high-strength USS T-1 steel used in the under-frames of the Jet Rocket. Every pound of alloy steel does a bigger job, because, pound for pound, such steels are stronger, more resistant to impact, and offer clear-cut weight savings.

Do you have a problem involving metals? Are corrosion, high temperatures, stresses, or fatigue causing trouble? Let's talk it over. We may be able to find out how nickel or a nickel alloy can overcome it.

* * *

Write for "List A" of available publications. It includes a simple form that makes it easy for you to outline your problem for study.

Nickel Alloys perform better, longer

INCO **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N. Y.

FIRST BY A COUNTRY MILE!

Ever since Valve Face Grinding Machines were invented, men who had to lay down their hard earned cash, have been comparing and choosing the one they liked best. *Today there are more* SIOUX *Valve Face Grinding Machines in use throughout the world than all other makes combined.*

There can scarcely be any stronger testimony to the superiority of one machine than the overwhelming choice of so many buyers over so long a time. You can buy your SIOUX Valve Face Grinding Machine with the utmost confidence in your choice.

SIOUX

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U. S. A.

ELECTRIC DRILLS • SCREW DRIVERS • SANDERS • GRINDERS • IMPACT WRENCHES • VALVE FACE GRINDING MACHINES • POLISHERS • PORTABLE SAWS • FLEXIBLE SHAFTS • ABRASIVE DISCS

NOW AVAILABLE FROM

MOTOR WHEEL

FLEXO 4

MALLEABLE IRON Journal Box Lids

CONTROLLED FLEXIBILITY

Spring-controlled construction compensates for varying condition of journal box mouth and hinge-lug wear.

TIGHT FIT

Keeps oil in and dust, dirt and water out.

LONG-LIFE MALLEABLE IRON

Lid life lengthened by physical properties that resist corrosion, shock and distortion.

POSITIVE OIL RETURN LEDGE

Conserves oil by keeping it from seeping out at mouth of journal box.

71

MOTOR WHEEL CORPORATION

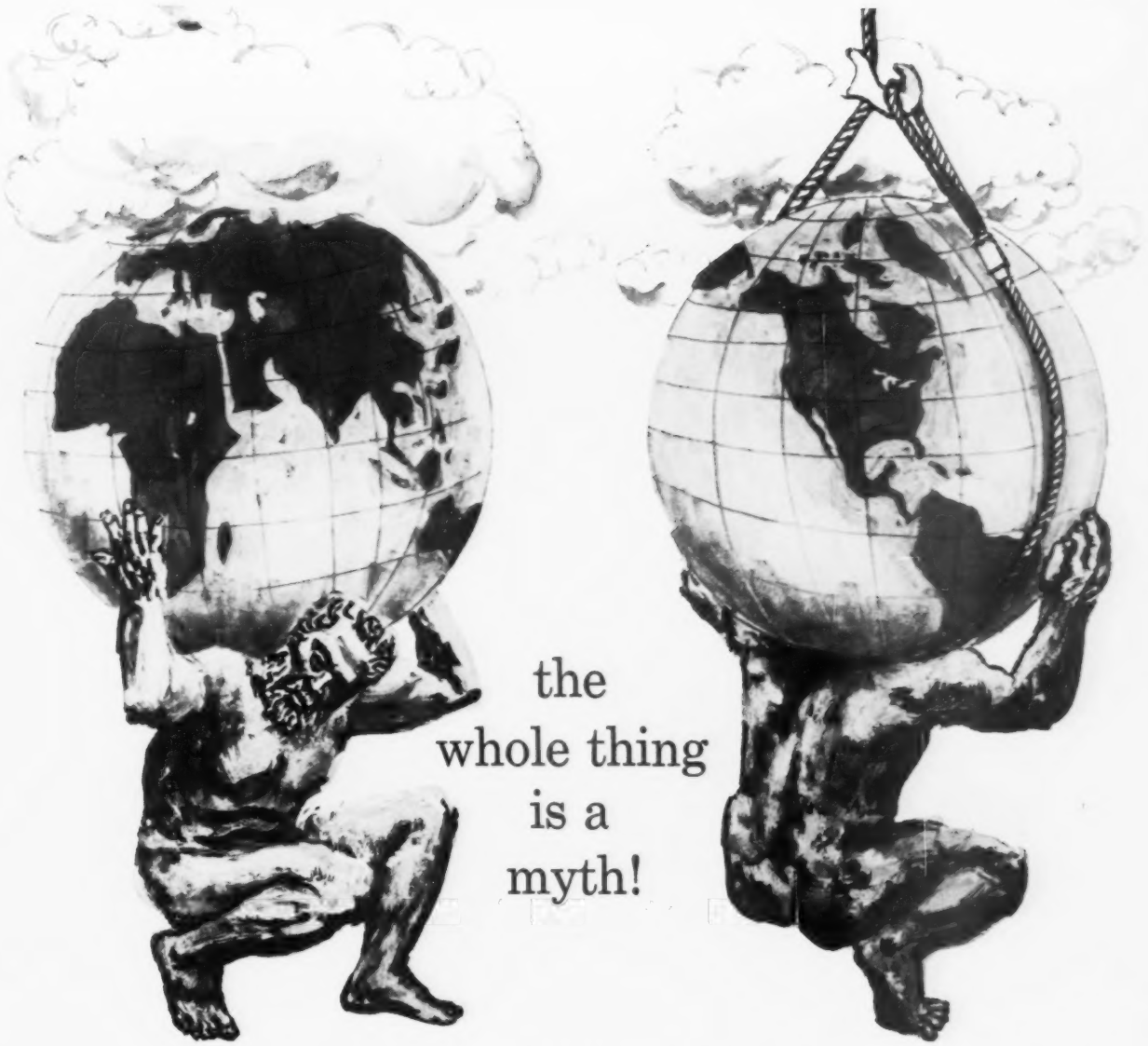
LANSING 3, MICHIGAN

National Railway Sales Representatives

T-Z RAILWAY EQUIPMENT CO.

G. S. TURNER, *President*

8 South Michigan, Chicago 3, Ill.



the whole thing is a myth!

...the work is done by a Roebling Sling!

It's a fact that holds true for lifting jobs in almost every industry you can name. The types of slings and fittings that are manufactured by Roebling would fill a book (and they *do*—a 51-page catalog that's yours for the asking).

The endless and often monumental materials handling needs of industry are met, in every respect, by the complete and completely dependable Roebling Sling line. They include: All-Purpose Slings, Grommet, Roegal® Cable-Laid, Flatweave and Railroad Slings; Flatweave Drawbar and Plate-Lifting Slings and a full line of end fittings. Within each of these categories are a variety of sizes, strengths and capacities.

Certain facts apply to all Roebling slings, whatever their use: advanced construction features certify safe, steady service and stability under load.

The new catalog that we'd like to send you is designed to make sling selection and ordering as easy as the job a Roebling Sling performs. Ask for A-931. Meanwhile, if you have any materials handling questions or want further sling information, your Roebling salesman or distributor will hasten to help you out. Write to Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

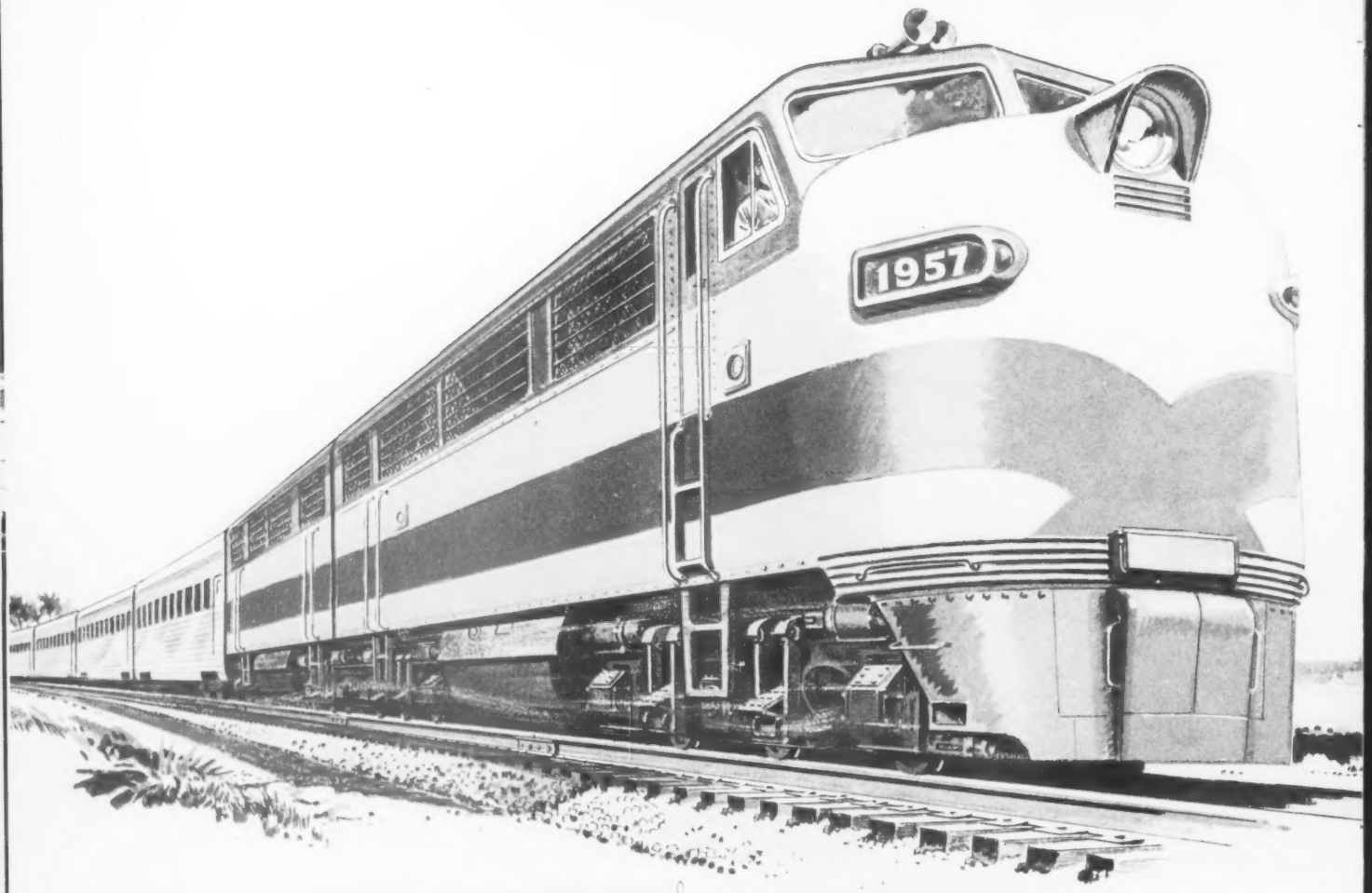
ROEBLING

Branch Offices in Principal Cities

Subsidiary of The Colorado Fuel and Iron Corporation

COBRA SHOES in

Save $1401.66



The COBRA SHOE

Product of the combined research facilities of . . .

Westinghouse Air Brake Company

Specialists in Braking

Johns-Manville

Specialists in Friction Materials

RAILROAD FRICTION PRODUCTS

Sunshine Service

per passenger car per year

SEVENTEEN CARS on a crack passenger run in the South were equipped with Cobra Shoes. Here are the results for average yearly mileage of 300,000 miles per car compared with a companion train equipped with cast-iron shoes:

1. **Cobra shoe life—38,095 miles per shoe**
2. **Cast-iron shoe life—7,500 miles per shoe**
3. **Wheel life with Cobra Shoes—133,000 miles per turning**
4. **Wheel life with cast-iron shoes—77,000 miles per turning**

The excellent mileage of Cobra Shoes and the increase in wheel mileage between turnings, revealed dramatically by this train operation, produce these outstanding savings:

Yearly brake shoe savings per car . . . . . $ 867.66
***Yearly wheel savings per car . . . . . $ 534.00**
Total savings per car per year $1401.66

**Wheel savings based on wheel charges specified by P. C. Rules 21 and 22 and Rule 105, A. A. R. CODE of RULES for the Interchange of Traffic, effective January 1, 1957.*

MAKE THIS INEXPENSIVE TEST

Equip an entire train with Cobra Shoes. Keep accurate records of brake-shoe costs and wheel-turning costs. Compare them with your present costs. You'll find that Cobra Shoes are one of the best possible investments you can make for quick return and continuing savings. Write for complete information to Railroad Friction Products Corporation.

Important facts about the COBRA* SHOE

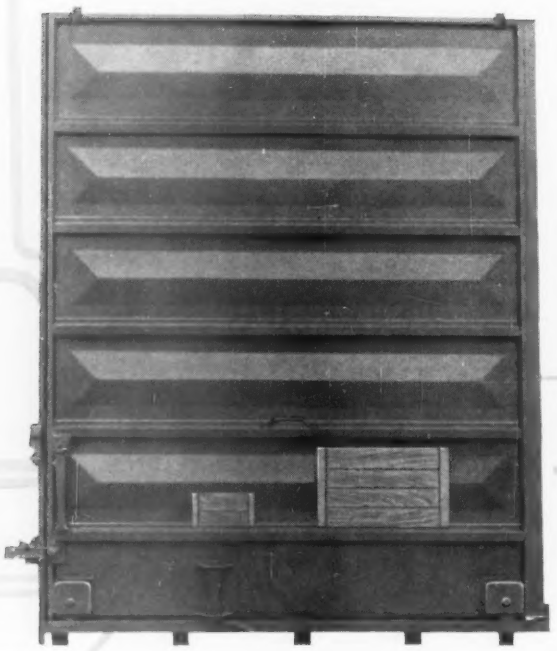
1. **Friction value is stable.**
2. **High friction value, permitting low shoe forces and simplified rigging, contributes importantly to lightweight train development.**
3. **Stopping distances meet existing standards—wet or dry —cold or hot.**
4. **With braking performance matched, wheel mileage between turnings is increased 50% to 100%. Shoe mileage is increased 400% to 500%. Result! Savings up to $1401.66 per passenger car per year!**

**Registered U. S. Trademark*
Composition Brake Shoe

FOR RAILROAD CARS, LOCOMOTIVES AND RAPID TRANSIT CARS.

CORPORATION, *Wilmerding, Pennsylvania*

BOX CAR SIDE DOORS



designed and built by Pullman-Standard

- Design: by the world's largest car-builder . . . with fifteen years' experience in door manufacturing.
- Size: 9′ 11″ or specified height. 6′-7′-8′-9′ or specified width.
- Complete with fixtures and subparts, all to P-S design.
- Panels of .10-inch corrosion-resistant copper bearing steel. Lock, starter and bumper of cast steel. All parts weldable.
- Extra-heavy (5/32-inch) bottom member.
- 5″ rollers in door roller assembly insure easy operation.
- Precision fabricated, embossed for strength, assembled by arc-welding.
- All around sealing arrangement excludes dirt and weather, safeguards lading.
- Self-protecting design and fabrication excellence mean long life, easy maintenance.

Pullman-Standard has designed, built and laboratory and service tested a new box car side door, with integral fixtures, to fill the needs and specifications of the railroad industry. Offering maximum lading protection from dirt and weather, this new door is sealed all around by specially designed interlocking contours. The unit rolls smoothly and easily on large 5-inch diameter rollers with hardened roller bearings. The safety latch and door lock work as a unit. And the safety latch automatically locks the door in either the open or closed position after one car impact. The entire door and fixture unit is made for lasting service, durability and rugged strength.

After extensive field research to determine railroad and shipper requirements, prototypes of this door were designed, built and put into continuous laboratory and in-service tests more than three years ago. Every possible test was applied time and time again. The P-S Door withstood every abuse. Example: over 75,000 severe individual roller and bearing impacts were test-applied to prove the door roller assembly.

Confirming "on the job" acceptance of this new unit by America's railroads are the more than 2500 car sets now in service or on order by 12 major users.

Replacement parts will be kept on hand by Pullman-Standard, and railroad orders will be filled immediately from inventory.

For full information on the new P-S Box Car Side Door, and how it can be applied to PS-1 Box Cars now on order, write for literature or contact the nearest Pullman-Standard sales office.

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

221 NORTH LA SALLE STREET, CHICAGO 1, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

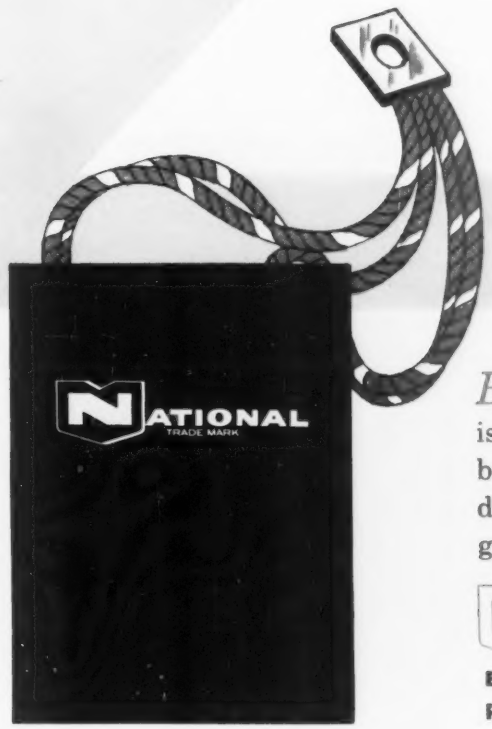
You get BOTH with

NATIONAL BRUSHES
TRADE-MARK

EXCELLENT COMMUTATOR CONDITION

LONG BRUSH LIFE

on equipment of all makes and types
—in all classes of service



Balanced performance . . .
is the big reason why more "National" brushes are both approved and used on diesel-electric traction motors and generators than all other brands combined.

NATIONAL BRUSHES
TRADE MARK

Best for all types of equipment...
preferred for all types of service

UNION CARBIDE

The terms "National", "Union Carbide" and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY • A Division of Union Carbide and Carbon Corporation • 30 East 42nd Street, New York 17, N. Y.

Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

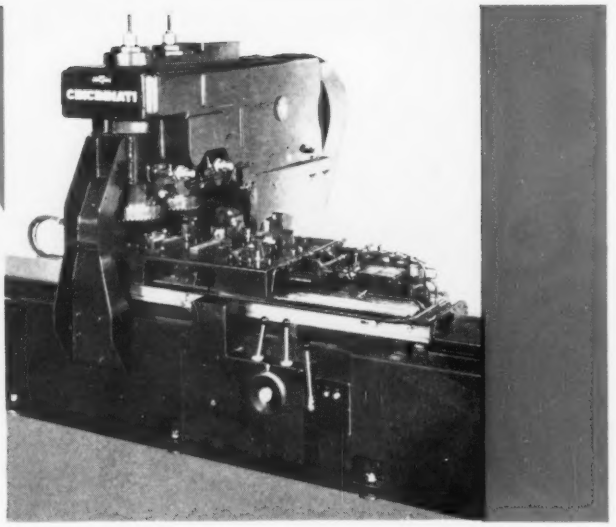
Reputation-Maker for the Wabash...

One of the nation's most famous trains, the Wabash streamliner "Blue Bird", ties Chicago to St. Louis with an enviable record of on-time service. Passengers have come to rely on the comfort and dependability of this fast blue beauty — much as the Wabash has come to rely on Sinclair for lubricating protection. Sinclair is proud to supply the pride of the Wabash with GASCON® Diesel Lubricating Oil... honored, too, that the record shows over 100 U. S. railroads specify this outstanding Diesel lubricating oil.

SINCLAIR RAILROAD LUBRICANTS

Sinclair Refining Company, Railway Sales, 600 Fifth Avenue, New York 20, N. Y. • Chicago • St. Louis • Houston

Easy on your Replacement Fund---



HyPowermatic with 50 hp main drive and two vertical spindles in a fixed housing, tooled up to mill the top and combustion face on cylinder heads. Many standard HyPowermatic units and features are incorporated in this machine.

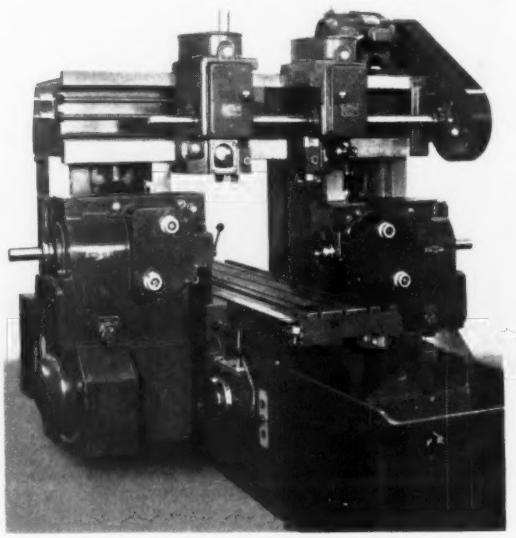
Cincinnati HyPowermatic Unit Construction Plan

Don't discard new production milling ideas as being too costly without considering Cincinnati's HyPowermatic unit construction plan. You may find that a special machine is entirely unnecessary. HyPowermatics are assembled from standard and complementary units to give you unusual combinations such as:

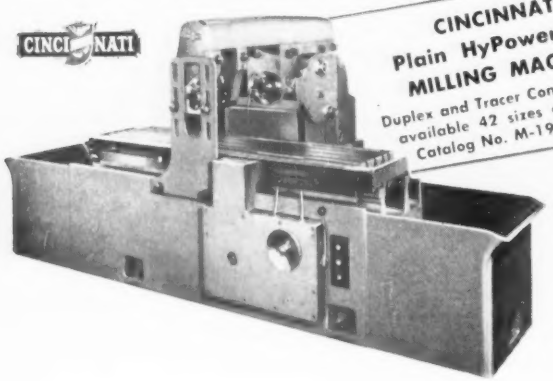
1) Close-coupled spindle carriers
2) Vertical and angular spindle heads; many styles and combinations, including adjustable angle
3) Ram mounted spindle heads
4) Fixed height or adjustable bridge type rail support for vertical spindle heads

Take a look at the heavy duty automatic milling machines in your shop which may have become productively obsolete. You may be surprised to see how much you can gain—in production and lower unit cost—by replacing with CINCINNATI® HyPowermatics, built up with standard and complementary units to suit the job. They offer many cost-cutting replacement possibilities. May we send you a copy of the new, fully illustrated catalog? For brief specs, look in Sweet's.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



HyPowermatic, duplex style, equipped with highly useful complementary units consisting of two additional spindle heads mounted vertically on a cross rail. This HyPowermatic can mill simultaneously the sides and top of box-shaped parts.



CINCINNATI
Plain HyPowermatic
MILLING MACHINE
Duplex and Tracer Controlled styles available 42 sizes of each.
Catalog No. M-1909.

CINCINNATI

MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS
METAL FORMING MACHINES • HARDENING MACHINES • OPTICAL PROJECTION
PROFILE GRINDERS • CUTTING FLUID • GRINDING WHEELS

Fuel tests on six General Motors road units were method C&NW used for arriving at answers on future fuels.

Lower Grade Oil Testing Brings Decision . . .

C&NW Diesels Will Not Get 'Economy' Fuels

The Chicago & North Western has decided that the disadvantages of using a lower grade fuel oil quite outweigh any advantages gained. After a thorough study and analysis of the results of diesel locomotive tests averaging eight to nine months with six General Motors units, the C&NW is no longer considering the future use of lower grade fuels. The road will use a grade of distillate in keeping with the specifications of the engine manufacturers.

The tests were run to explore the potential use of a lower grade fuel at a reduced purchase price in terms of diesel engine performance and overall economy. Some of the disadvantages found with the test fuel are instability of the fuel and the increased maintenance due to greater wear and deposits in the engine. There is also a definite relationship between the quality of the fuel, lubricating oil deterioration and consumption, and the locomotive operating efficiencies, engine wear and deposits.

In April 1955 the C&NW placed in test service six EMD units—four operating as two locomotives using test fuel, the other two operating as one locomotive using regular fuel.

Each unit was powered by a 1,500-hp EMD 16 cylinder, V-type, 2 cycle diesel engine, type 16-567B. All parts of the engine were standard as specified by the engine manufacturer. Two completely new or reconditioned power assemblies were applied to each engine in opposite banks, the No. 7 and No. 15 positions, at the same crank location.

These units were used in pool service operating in tonnage road freight service over relatively level terrain, with a maximum gradient of approximately 1.26%, and with many curves.

The locomotives handled tonnages ranging from 1,900 minimum to 6,500 maximum, and maintained average speeds of 30 mph, with maximum speeds of 45 mph. Sanding was used under power and when braking. Special fittings were installed on the fuel tanks of units using the test fuel so that mixing with any other fuel could not occur.

The crankcase lubricating oil used was a regular heavy-duty de-

Heavier deposits of carbon and lacquer showing typical condition of piston in test fuel units (left), and regular fuel units (right). There was no appreciable wear in outside diameter in any of the units.

Circumferential deposit of oxide films on piston pin. This is typical of few test fuel units.

tergent, SAE 40. A 100% catalytic cracked No. 4 oil was used, a product from the newly developed Fosteron fields in Dakota and Canada, refined in Casper, Wyo. For comparison purposes, the regular C&NW specification No. 2 fuel oil was used.

Test History

Before starting the test, all engines operating on both test and regular fuels were inspected and found to be normal operating condition. During the test, each engine was examined at three month intervals. Engines in which lacquering was noted, were examined as frequently as one month intervals. These examinations included inspection of lube oil filters and strainers, fuel filters and air filters.

Air box inspections were conducted to determine intake port deposits, appearance of piston crowns, condition of rings, piston skirts and liners, and general engine cleanliness. Significant deposits were found on both test and regular units. More deposits were found on the test engines throughout the tests than on the engines using the regular No. 2 fuel.

Lubricating oil filters were changed semi-monthly. Fuel oil filters (pressure and suction), and carbody and engine intake air filters were changed at monthly intervals.

Engine Modifications

At the beginning of the test, the power pistons in the test fuel engines were changed from $1\frac{1}{32}$ in. to $\frac{3}{8}$ in. in order to compensate for the higher BTU test fuel. Engines using the regular No. 2 fuel were left at $1\frac{1}{32}$ in.

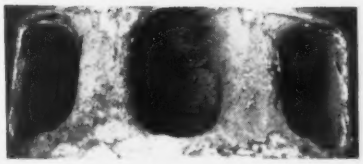
On October 10, 1955, since lacquer deposits were forming at a higher rate on the test engines, changes were made in an attempt to alleviate this condition. On the four test units, the fuel injection timing was changed from 4 deg BTDC to 6 deg BTDC. On two of these units, fuel oil filters were applied to detect any advantages as compared with the other two units. The rate of varnish deposits decreased as a result.

Test Results

On October 26, 1955, after an engine inspection, it was concluded

Average Properties of Fuel Oils Used for Tests

	Test fuels		
	April 1955 to August 1955	August 1955 to January 1956	Regular fuel
Gravity, deg API	26.3	29.1	35.9
Viscosity, SSU @ 100 deg F	35.4	35.4	33.9
Sulfur, % wt.	1.01	0.95	0.45
Pour point	0	0	0
Flash point	210	210	170
Cetane Number	30	35	49
ASTM distillation, deg F:			
Initial boiling point	468	440	346
10%	478	478	417
90%	606	595	580
End point	650	654	640
BTU per lb	19,302	19,414	19,686
BTU per gal	144,128	142,441	138,550



Light carbon deposits on cylinder head exhaust port. This is typical condition of all units.

Carbon deposits showing about 20% closure of cylinder liner intake ports is a typical condition in test fuel units (left), as compared with regular fuel units (right).

that the inherent unstable nature of the test fuel required a stabilizing additive which was then added to all test fuel used until the end of the test.

Locomotive availability was somewhat affected by the use of the test fuel. In general, however, both the test fuel and the regular fuel locomotives fulfilled their assigned work schedules during the test period.

Piston discoloration and deposits were higher on the test fuel pistons than the regular fuel pistons. Ring groove deposits were heavier on pistons operating on test fuel, with deposits in all cases being carbon deposits. There was an average wear of .001 in. on the outside diameters of the pistons used on the fuel tests.

Top piston ring wear in the test units was greater than the regular units, being .041 in. against .028 in. On the Nos. 2, 3, 4 and 5 rings, the wear was approximately the same in all units, averaging .013 in. There were no broken rings during the test and no evidence of stuck rings. All rings were free at termination of test.

Cylinder liner average wear was greater in the test units, but the difference was small. In general, the lacquer deposits were considerably heavier on the inside bore of the test liners. Actual slight flaking occurred.

Engine Deposits

Deposits on the cylinder liner intake ports averaged considerably heavier on the test units. Piston carrier bushings and thrust washers were normal in appearance and wear was low on all units. Piston pin bushings were normal in appearance on the regular fuel units, with very little wear on any of the units. Several assemblies on the test units showed slight scoring.

Piston pins on all units showed very little wear. Piston pins on the regular units were normal in appearance. However, on the test units, some of them had circumferential deposits of oxide film. All cylinder heads were in normal condition, with very little deposits in valve seat and exhaust port areas. All exhaust valves were normal in appearance and showed slight carbon deposits on shoulders and some lacquer on stems.

No serious injector trouble was experienced during the test. Carbon build-up on the injector tips was approximately the same on all units, with no injector sticking. All racks remained free. No excessive wear was found on parts of injectors using both test and regular fuel.

There was no noticeable difference in the performance of the lubricating oil and fuel oil filters. The test fuel reflected a higher rate of crankcase lubricating oil deterioration, indicated by lube oil changes due to oxidation, additive depletion and increased oil consumption. On the two units using regular fuel, there were two changes made, three due to oxidation and oxidation. Of the four units on test fuel, a total of nine changes were made, three due to oxidation and one to additive depletion. Other reasons included fuel and water leaks.

Summary of General Operation

	Test fuel**	Regular fuel
Duration of test	8.3 mo.	9.0 mo.
Total miles of units	142,240	95,638
Average miles per unit	47,413	47,819
Total gallons fuel used	318,530	———
Average gallons fuel per unit	106,177	———
Gallons consumed per mile	2.24	———
Approx. hours of idle per day	9	9
Approx. hours of load per day	15	15
Average miles per unit, month	5,712	5,313
Avg. fuel consumption (gal per unit month)	12,792	———
Avg. fuel consumption (gal per rated HP month)	8.5	———
Average tonnage per two units	3,600	3,600
Average maximum tonnage	6,500	6,500
Average minimum tonnage	1,900	1,900
Lube oil consumption per unit, gal	1,148	569
Make-up lube oil consumption (gals. per 1000 unit miles)*	13.6	7.4
Number of lube oil changes per unit	2.3	1.0
Number of lube oil filter changes per unit	17	18
Number of locomotives involved	1½	1
Number of units involved	3	2
Number of diesel engines involved	3	2
Number of measured power assemblies involved	6	4

* Excludes oil for lube oil changes.

** Data of three units only account one unit failure during test.

CAR DEPARTMENT'S
'PERFECT SHIPPING' PROBLEM . . .

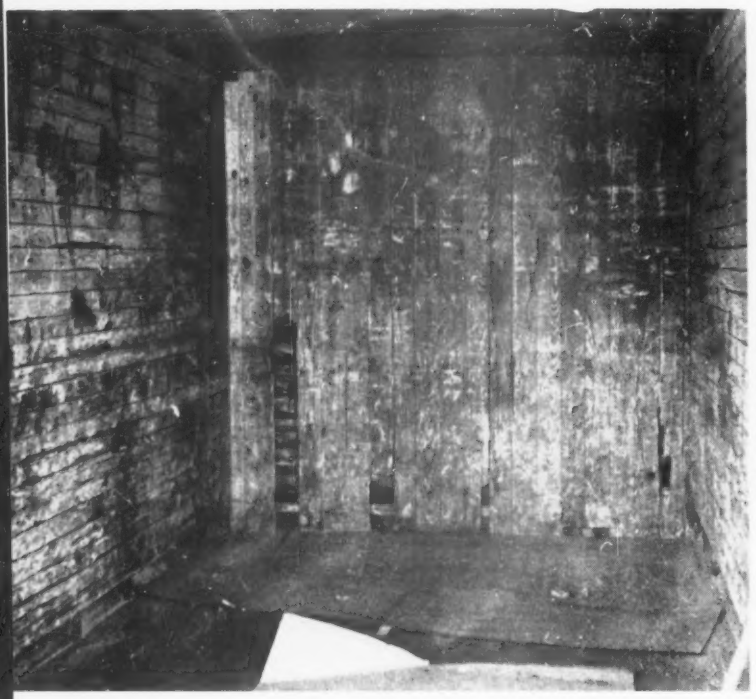
What Should

1 **What Is The Upgrading Problem?**

2 **How Is Upgrading Accomplished?**

3 **Where And When Is Upgrading Done?**

4 **What Keeps Cars In 'A' Condition?**



Condition and cleanliness of freight car interiors are matters of constant concern for railroads and their customers.

What Is the Upgrading Problem?

Upgrading on some lines does mean making the interiors of closed cars clean and tight for grain and other high-class commodities. However, not all lines feel that upgrading applies only to box cars, and many have much broader programs than the one indicated above. Pertinent comments from some of the more than two dozen railroads queried were the following:

● "Upgrading on our railroad means not only rendering the interiors clean and tight, but putting the entire car generally in first-class condition."

● "For us it means raising the car to the top classification that underframe and general condition dictate. We always go over cars completely—underframes, roofs, trucks and paint as well as interiors."

● "To upgrade a freight car would first require that it be placed in first class condition both inside and outside. This would mean particularly the relining and reflooring of a box car so as to make it suitable for high grade commodity loading. The second step would be to add special equipment such as lading strap anchors and 'DF' loaders to meet special requirements of shippers."

● "Upgrading only applies to conditioning the interiors of cars for highest classification possible without general repairs."

● "The upgrading of closed cars means not only making the interiors clean and tight for a particular commodity, but doing the necessary work to make the car suitable for any and all high grade commodities, and to preclude the necessity of placing the car on a repair or upgrading track before each loading. During times of severe shortages of high-class cars, however, it is expedient to merely do the minimum involved to render the car fit for a particular high-class commodity."

● "To us it generally means making cars suitable for paper loading."

● "Upgrading means more than making closed cars suitable for grain and other high-grade commodities. On our clean-out and light-repair tracks, we may upgrade a 'D' or low class car to a 'C' or better; or a 'C' to an 'A' or 'B' by replacing a small amount of lining or a floor board (any repairs that do not entail a large amount of material or labor). Our heavy repair shops upgrade all closed cars to be 'A' or 'B'. We also paper line cars for handling grain which otherwise would not be suitable."

● "We do not upgrade cars for grain or better. We do upgrade cars for general use."

● "Upgrading involves making cars fit for high-grade commodities by renewing side and end lining when rough or broken, and applying a new floor surface."

● "This could apply to any type of car but is most commonly applied to box or closed cars and involves more than rendering the interiors clean and tight. In Upgrading to haul a higher class commodity, contamination and odors must also be removed."

● "Our upgrading is intended to put cars in condition to handle foodstuffs. It is to upgrade cars from class 'C' to 'A'. Cars are not raised from 'C' to 'B', and

Your Car Upgrading Accomplish?

Could a box car be built that would stay in Class "A" condition permanently? April's "Perfect Shipping" campaign coincides with an annual railroad concern over supplying high grade box cars for movement of seasonal grain crops. However, changes in America's economic and technological patterns have made the demand for "A" cars almost perpetual rather than strictly seasonal.

Our surveys have shown shippers almost evenly split on whether or not railroads are doing an adequate job of supplying suitable cars. Railroad mechanical departments are almost unanimous in rating "upgrading" as a year-round problem; but the methods, materials and scope of these programs vary considerably. A coast-to-coast survey of railroad mechanical department officers answered many important questions, and gives an overall picture of this upgrading problem.

'X' cars are never upgraded but are shopped for complete rebuilding. The upgrading operation takes up to 35 man hours. More labor makes the operation a class repair job."

How Is Upgrading Accomplished?

What Is Done?

Cleaning cars and making their interiors tight and smooth summarizes upgrading on many lines. Some roads report that considerable work is necessary to make doors, sides, ends and roofs water tight. The problem of providing a smooth interior is solved in a number of ways. Nails and splinters must be removed. Holes in sides, ends and floors must be filled. There are several materials other than the traditional lumber which are being used; our survey yielded information on their acceptance. Eliminating contamination is a major job, and several roads admit that sometimes the only solution can be lining replacement. At the same time a number of other methods are suggested.

What Upgrading Materials?

Lumber: At the moment railroads are showing a preference for those materials which have always been used for lining cars—tongue-and-groove and butt lumber. Only one line reported that these are not used for upgrading, and two qualified their use. One complained about the cost of T&G, and the other said that it is difficult to get good quality.

Plywood: Fifteen lines reported that they do use, or have used plywood for upgrading, while thirteen others said they have no experience with this material. Among the 15 users, ten regard it as a standard for upgrading. Other comments include the following:

- "Used in ends of cars for quick upgrading."
- "Used to replace badly damaged lining."
- "Only for repairs to foreign line cars."
- "Economical but subject to theft."
- "Has been used in past, but discontinued because of cost and splintering."

Special Paper Lining: Special paper linings have not been used by twelve of the roads surveyed, and 15 report experiences with these materials. Ten roads use them regularly, and comments from others include the following:

- "Good acceptance for grain cars but not acceptable for paper, sugar or flour due to asphalt binder."
- "Good for one load only."
- "Not mechanically satisfactory."

Plastic Fillers, Paints and Sprays: Among the dozen lines which reported experiences with plastic compounds, six are regular users. Two of the dozen lines which have not tried them rejected the idea because of cost. Comments from users included:

- "Most economical method of upgrading floors for any purpose."
- "Satisfactory for minor patch work. Expensive for extensive patching and only good for one or two loads."

(More on next page)

- "Used on malt loading cars only."
- "More or less temporary repair."

Paper Grain Doors: While not strictly an upgrading operation, this survey took advantage of the occasion to ask about experiences with paper grain doors. Grain doors are usually applied while a car is being upgraded for grain service. Twelve roads use them (ten regularly), and eleven report no experience. Reactions included the following:

- "Not as effective as wooden grain doors. Advantage is their low cost."
- "Paper grain doors on cars received from other lines give some trouble because they bulge against the sliding doors and tear when the doors are opened."

One railroad has upgraded some single-sheathed box cars by spraying interiors with cement and covering the interiors with tempered hardboard. Excellent results are reported. Another reported that the interiors of roofs have been lined with plywood to prevent condensation.

Eliminate Contamination?

One railroad reported that its cleaning tracks are equipped with Vapor "Upgraders." These small electric steam generators are used for both routine cleaning and for elimination of contamination. Washing, steaming and airing all play their parts in eliminating freight car contamination. Used with the hot water and steam are the following materials: deodorants, disinfectants, detergents, chloride of lime, soda ash, Oakite Penetrant, and other cleaning compounds.

One line said that it runs cars "through the washing plant and uses whatever chemicals are necessary to remove the stains and odors." After thorough washing, several lines attempt to seal contaminated areas in the lining by using Cemtex, paint, shellac or varnish. One road reports that it eliminates odors in cars by burning brown sugar in them. When all else fails, it is necessary to strip part or all of the interior and apply new floor and lining. One road reported that it is sometimes necessary to sand blast and red lead the inside of the body after the lining has been removed to eliminate contamination.

Upgrade and Paint?

Differences in the definition of upgrading cause some differences in answers about whether upgrading is always followed by painting. Three roads always do it. Ten roads paint the car if it needs it, or if it has been moved to a back shop for upgrading. Seven lines do not associate exterior painting with upgrading.

Where and When Is Upgrading Done?

Upgrading is a year-round operation on nearly all railroads. The grain roads report that the activity must be intensified during the loading season. Three roads reported that their upgrading operations are strictly seasonal.

The money for upgrading comes from the budget for general car repairs on most railroads. Twenty-four of 28 roads reported that this is the case. Three lines do make "upgrading" appropriations, but generally these are for some items which are additions and betterments, or for work which finally is rated as heavy repairs.

Fourteen lines said that they are unable to estimate the number of cars which will be upgraded during a coming year. One reports that it endeavors to "program the work as much as possible." Five say that they are able to predict the upgrading demand. Pertinent comments include:

- "We can estimate within ten per cent."
- "Cars to be upgraded by general repairs are cov-

The Problem: There Are Not Enough

An Operating Officer Says . . .

"Few commodities will now load in rough-freight box cars. Shippers of lumber, brick, clay, cotton, and many other commodities formerly content with rough-freight box cars will no longer load them. They demand Class 'A' cars, and nothing less than 'B' will satisfy them.

"From some checks made of all empty box cars passing our terminals, we found the break to be about 55 per cent rough freight, 33 per cent Class 'B' and 12 per cent Class 'A'. Of course, these were not all our cars; most of them were of foreign ownership—the bulk of our cars being on other railroads. When it is considered that about 80 per cent of the lading offered today demands Class 'A' and 'B' cars, the disproportion between loading offered and car available is clearly evident.

"The tendency is for these low grade, unneeded cars to drift uselessly back and forth, and from road to road . . . The business could be moved with a much smaller fleet of cars in good repair. Expensive cross hauling, yardings with wasted switching, could be wiped out. The problem of keeping track of and supplying empties for loading would be greatly simplified. . . .

"Bad order ratio is meaningless as applied to box cars, because that ratio might be as low as one per cent but all the cars might be rough freight, providing very few loadable box cars. A better and certainly a more revealing ratio for box cars might be the rough-freight ratio."

D. W. Brosnan
Vice President—Operations
Southern Railway
RSPA Meeting, November, 1954

ered under an expenditure authorized by the vice president's office on the basis of a proposed yearly program covering all series of cars estimated to need general shopping. Cars upgraded by paper lining, or by sweeping and washing are upgraded, as required, upon advice from the transportation office."

● "Estimates made in advance have not been a good guide on what will be spent on an upgrading program. Demand for high-class cars and the availability of cars suitable for upgrading fluctuates too much from time to time and from point to point to make a budget allowance effective."

Eleven railroads report that all of their car repair tracks do upgrading work. Nine say that certain of their repair tracks and the back shops perform this work. Seven consider upgrading as a back shop operation. Most railroads assign upgrading to all car repair faces when the work is available, and four report that they make the work the assignment of special gangs.

What Keeps Cars In 'A' Condition?

Existing Cars: Eight of the railroads report that they have no regular program for making changes in existing equipment to keep it in "A" condition longer. Seven lines have programs for strengthening floors on existing cars. One line puts in "double floors and floor reinforcement." Another makes the recent AAR order on new box car floors applicable to all its cars as they are shopped. This calls for additional stringers and the use of 2⅜-in. decking. Five roads make considerable use of nailable steel flooring, and threshold and floor protector plates at doorways when cars are rebuilt.

Lading anchors are a regular addition to all or some of the rebuilt box cars on eight roads. Six lines report regular programs of adding "DF" loaders, and two apply some "compartmentizers." One line reports that it is substituting "1½-in. end lining for $^{25}/_{32}$-in. end lining, and on a great many cars we install an interlaced, dovetailed, combination steel and wood end lining."

Changes in original design are probably well summarized by one road which reports that "cars are generally repaired in kind except where deficiencies in original construction are noted, or where improved design warrants a change which will reduce future maintenance, or improvement is justified from an economic standpoint." One road said that "18-yr old box cars are getting new sides with 9-ft door openings and new roofs." Another said "several thousand box cars are being equipped, when shopped, with a stronger doorway reinforcement due to structural deficiency at that point." Still another said that "side sills and door post connections are strengthened."

Eight railroads are already adding journal lubricators to cars as they are shopped. Two of the lines reporting have been applying roller bearings to some existing cars. Nine lines add ride control to trucks when cars are shopped for heavy repairs.

The money that will be expended on a partially depreciated car for additions and betterments will not be dictated by the book value of the car on most lines. This was well summarized by one road's report that "the extent of additions and betterments to be applied to a partially depreciated car is not based on cost. If we consider a car, such a box car, to be of modern design even though partially depreciated, latest improvements such as lading strap anchors and auto loader devices are installed because this car, after having received heavy repairs, will be placed in first class condition with at least ten years of expected life."

Another line said that "applications of specialized loading equipment, or additions and betterments are authorized only on the results of studies indicating that a fair return will be realized on the investment." Still

Cars in 'A' Condition Today

And A Shipper Agrees, Says . . .

"We conducted a nationwide poll in 1955 on the suitability of box cars for loading edible products. This poll shows that, of the cars furnished for loading edible products, 61.6 per cent were substandard with either rough interiors or protruding nails; or they were contaminated, infested, or otherwise unfit for loading.

"Since that time, the Southwest Shippers Advisory Board has conducted quarterly polls and there is no substantial improvement in this condition. In the Southwest, 53.3 per cent of the cars furnished for loading were unfit in 1955, and the figures since that time have remained consistently the same or worse.

"The basic fault is the lack of a uniform system of carding and grading which permits the abuse of a carrier's equipment after which there must be an expensive upgrading program. This could be eliminated, or greatly minimized, if the carriers would adopt a uniform system.

"The AAR did make an attempt to establish a uniform system of carding and grading, issuing their Circular T 25, dated December 17, 1937 and revised 18 years later,—July 8, 1955—Circular T 251. But their efforts were inadequate in the very beginning and practically none of the carriers adhere to the so called uniform system recommended by the AAR. Each has his own individual system. The result is that none of the carriers speak the same language."

R. R. Rabon
Traffic Manager
Campbell Taggart Associated Bakeries
February, 1957

Here Is What Your Customers Think of Your Cars

Shippers Split On Upgrading Results

Your freight car upgrading meets the requirements of nearly half of the shippers questioned in a recent ballot conducted by our companion publication, Railway Freight Traffic. This group's opinions were that upgrading has helped to improve the overall condition of the freight car fleet, that in most cases enough cars are being upgraded, and that the work being done during this upgrading has usually been adequate.

Dissatisfied shippers represented a slim majority among those voting. Many of the points raised by this group are not items covered by the typical car upgrading. These include greater structural strength, wider doors, and other major changes which must be incorporated when cars are built new, rebuilt, or when they receive the heaviest of repairs. Several shippers called for improvement in riding qualities.

Below are some of the comments which accompanied the ballots. Those who expressed dissatisfaction with present upgrading offered the largest number of suggestions, and most of these comments are necessarily theirs.

- "We need better banding and bracing anchors; steel and wood in preference to plywood for inside siding; and better flooring—perforated steel and wood."
- "Need is for more 50 ft box cars with minimum door opening of 10 ft. Car lining of plywood is very good."
- "Upgrading is not adequate for canned goods. The primary source of damage is bowed end walls. Replacing or repairing wood car lining only is not effective. To be effective, steel framing on end walls should be squared and straightened. Few carriers do this in their upgrading programs."
- "We find hardware on doors either broken or inoperative making cars difficult to open. Suggest using steel flooring plates on flat cars to protect flooring."
- "Certain individual railroads are doing an outstanding job in upgrading their equipment, replacing outmoded equipment, and providing good all-purpose cars. Total result is retarded by those carriers whose programs are inadequate, fluctuating and depending on other carriers to furnish a car supply."
- "Improved draft gears and trucks prevent damage and make satisfied customers."
- "Satisfactory heavy repairs but the railroads need more uniform program of upgrading cars. Poor floors and bulged ends are our biggest problems. Plywood lining and new floors suit our product best. Steel flooring would do, but not scattered flooring plates."
- "We find decks of gondolas in poor shape. Many box cars which are furnished to us for Class 'A' cars have been going bad because of poor running gear."
- "While we use very few box cars for shipping beer, we are interested in the upgrading of refrigerator cars by installation of wider doors, perforated steel floors, and movable bulkheads."
- "Upgrading has been satisfactory but the number of such cars has not been adequate to meet the demand."
- "Most gondolas are being repaired with steel floors and sides replacing original wood floors and sides. This forces shippers of heavy machinery to load flats that are very hard to get."
- "Too many flat cars have poor decks."
- "We believe lumber or heavy plywood to be the best lining materials. Lading anchors or adjustable gates would serve to tie down loads and avoid shifting of lading."
- "We continue to receive reports from our factories of poor cars. These reports are not so numerous as they were 12 to 18 months ago."
- "Metal nailable floors are very desirable. Favor, and use whenever available, the 'DF' or GAEX cars and believe that there should be more attention given to this type. It is possible, we have been told, to convert regular box cars to this type of car."
- "Plywood or some other material to seal the sides, and steel floors, serves our use best."
- "Plywood sides are the best improvement, but wooden floors are in bad condition. Therefore, steel flooring is sought."
- "Prefer, and get in most instances, plywood lined box cars for our type of commodity."
- "We are vitally interested in the efforts of railroads to upgrade freight cars. The railroads are making good progress but upgrading is not the sole answer to the prevention of damage to lading . . . we are convinced this enormous [loss and damage] figure can be reduced by 75 per cent if railroads will embark upon a program to build general all-purpose box cars that will eliminate vertical oscillation and longitudinal impact shocks."

"No program will effectively keep cars in 'A' condition permanently without incurring costs too excessive to be justified."

another stated, "Need dictates the cost."

New Cars: Most roads when ordering new cars attempt to correct deficiencies which have become apparent in previous designs. One road's approach is "a large car shop now under construction to maintain regular cycle repair programs to keep equipment in 'A' condition permanently." Another suggested that an approach to the permanent "A" class car would be "heavier end sections, stronger doors, thicker flooring, ride control trucks, lading anchors and journal lubricators." Said another, "We are building our new cars stronger in every way such as heavier side and center sills, plenty of floor supports, stronger ends, rubber draft gears, steel wheels, and tightlock couplers."

Some roads say that they can do nothing to make cars which will stay in "A" condition. Said one, "We have found no program which will keep our cars in 'A' condition permanently without incurring costs which we consider too excessive to be justified." Another states that there is nothing more that needs to be done for cars intended for grain, flour and feed.

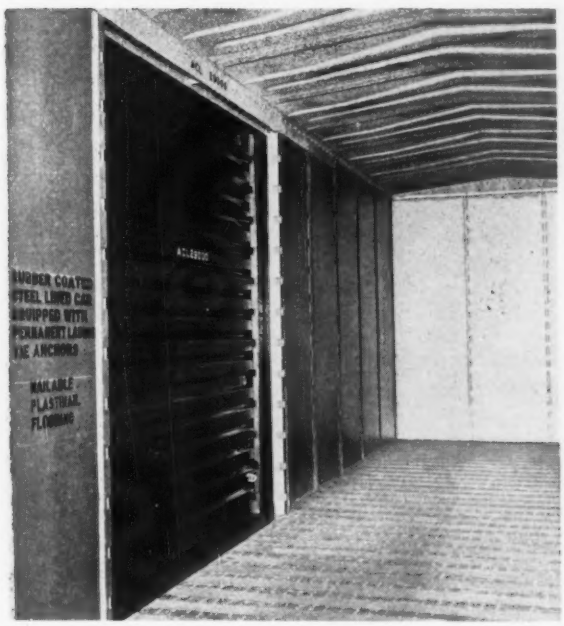
One line said "With the widespread misuse of high-grade equipment today, we do not know of any method which will keep a car in 'A' condition permanently. However, a heavier end lining and decking, nailable steel flooring, lading anchors, door post protection and other features tend to keep box cars in 'A' condition for a considerably longer period."

The entire problem was summarized by one Midwestern line which said, "To keep new cars in 'A' condition longer or permanently is a constant problem that requires the attention of all people in the operating, transportation and mechanical departments."

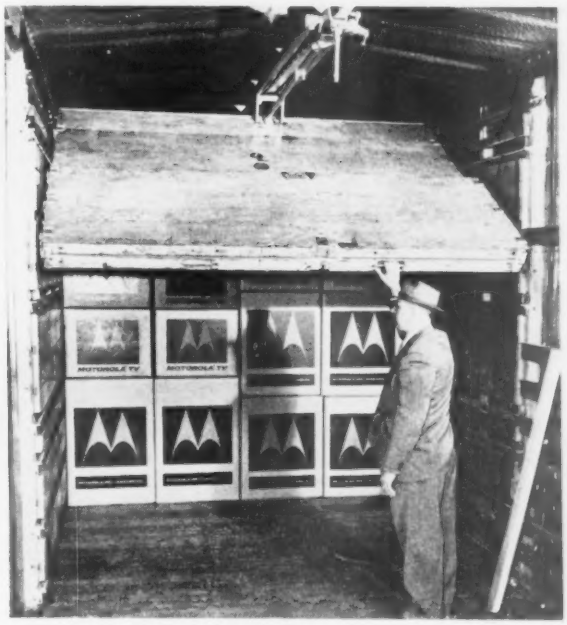
For a review of upgrading equipment and materials described during the past year both in Railway Locomotives and Cars and Railway Age, see pages 99-103 of this issue. . . . Editor.

Coast-To-Coast Survey

Information was provided by the mechanical officers of the following railroads: Atlantic Coast Line; Atchison, Topeka & Santa Fe; Bangor & Aroostook; Bessemer & Lake Erie; Boston & Maine; Central of New Jersey; Charleston & Western Carolina; Chesapeake & Ohio; Chicago & Eastern Illinois; Chicago & North Western; Delaware & Hudson; Delaware, Lackawanna & Western; Erie; Gulf, Mobile & Ohio; Illinois Central; Illinois Terminal; Lehigh & New England; Lehigh Valley; Milwaukee; Minneapolis & St. Louis; Missouri Pacific; New York Central; Norfolk & Western; Northern Pacific; Seaboard Air Line; Soo Line; Southern Pacific; Spokane, Portland & Seattle, Texas & Pacific; Union Pacific; Virginian, Wabash; and Western Pacific.



Steel-lined box cars of Atlantic Coast Line have metal lining panels welded and locked in place. Bonded to lower surface of each panel is Neoprene sheet 36-in. high. Walls, ends and roof are coated with aluminum-colored Neoprene paint. Car has lading anchors and Plastinail floor. Sliver- and vermin-proof interior arrangement serves to strengthen car structure.



Partitioning and load-locking Evans "Quick Loader", recently developed, is typical of devices being applied to new and existing cars to protect lading and at the same time make it unnecessary to damage the car interiors while securing these loads. Many railroads are showing increased interest in lading anchors. "DF" loaders and similar devices for their existing cars.

SP Specifies the 'What' and 'How'

By C. F. JURSCH*
General Inspector
Research & Mechanical Standards
Southern Pacific Company
San Francisco, California

With the rapid change-over from steam to diesel power, many new problems have arisen. Practices which had long been used with steam power have not been effective on diesels. The materials first used as cleaners on the diesel locomotive were those which had been used on steam power. Unsatisfactory results led to poor housekeeping, affecting the overall appearance of diesel locomotives as well as contributing to fire hazards and ineffective preventive maintenance. Cleaning materials and methods have had to be improved and standardized.

Cleaning materials originally were purchased on a competitive basis from a number of manufacturers. The use of alternate brand names and manufacturer's code numbers became increasingly confusing to Southern Pacific maintenance forces. To eliminate the confusion, a Southern Pacific reference number was assigned for each type of cleaning material used. This reference number eventually became the Southern Pacific specification number.

Specifications now have been issued for most standard cleaning materials. Prior to writing a specification for each individual material, manufacturers were contacted and asked to submit samples of their materials which they recommended for the specific job. These samples were then sent to the SP laboratory where they were examined and subjected to laboratory tests and analysis. From results of laboratory tests, two or three of the materials which were considered to be the best suited for the particular job were further tested in the field. Results of field tests were correlated with laboratory tests and a specification was written. Specifications have been developed for a dozen different classifications of cleaning materials.

This system inaugurated a simplified practice for purchase and identification of cleaning materials. It has been of considerable aid to storekeepers in handling and segregating the various materials as well as eliminating confusion and misuse by shop forces. Cleaners furnished in drums have the entire drum or at least a center band painted in a distinctive color before applying the number and name of the cleaner. All other stenciling such as the order number, date, and manufacturer's code number is confined to the head of the drum. The only marking or labeling permited on the cylindrical surface of any drum is the approved Southern Pacific specification number and designation.

The next step in standardization was to issue a circular classifying cleaners and listing the uses to which they might be put. This circular shows the specification numbers and name, drum color, type of material, instructions for mixing and use, safety precautions to be followed, normal solution strength, pH of solution and authorized use for each material. These instructions are posted at all locations where cleaning operations are performed, and have been very helpful in preventing waste, controlling solution strengths, preventing misuse of materials, and giving ready reference to the necessary safety precautions to be followed when mixing or applying.

Standardized Diesel Cleaning

Having developed suitable cleaning materials it was also necessary to standardize the methods and equipment required to do the diesel cleaning work with the least amount of hand labor so costs would be kept to a minimum. The cleaning program was divided into three main phases:

(1) Exterior cleaning
(2) Interior cleaning
(3) Diesel engine cleaning

For maintenance cleaning, the exterior sides of the diesels are washed with mild alkaline cleaner in concentration of 4 oz per gal. of water. Mechanical washers are used on the road locomotives after cleaning solution is sprayed on the sides, brushed and rinsed. Switchers are cleaned by hand. A specially designed ASME pressure tank, mounted on a hand truck and equipped with an air pressure regulator, safety valve, hose and nozzle with valve and spray tip is used to apply the cleaning solution which is followed by hand brushing and complete rinsing. Instructions have been issued to avoid spraying cleaning solution on panel type car body air filters, to prevent removal of oil from the filters.

SP's locomotive cleaning has been standardized and is done when units reach terminals such as Los Angeles.

*Presented to the American Society for Testing Materials at Los Angeles, Cal.

# of Its Diesel Locomotive Cleaning

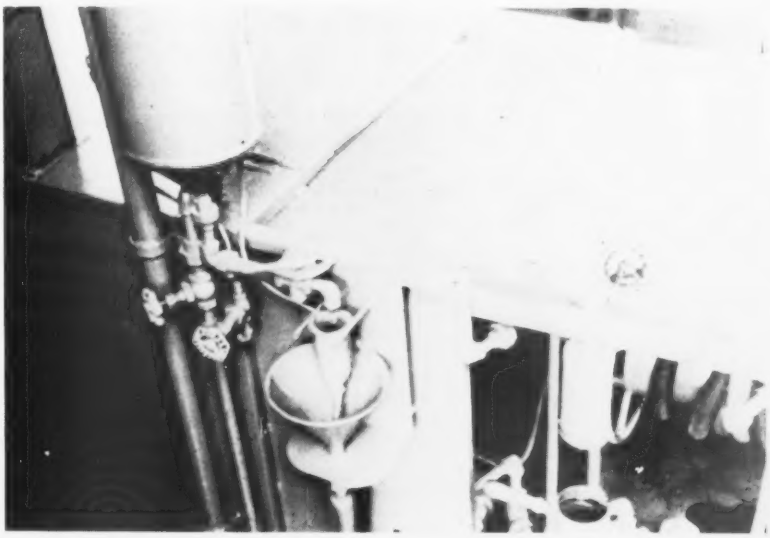
Nose and windshields are hand cleaned using the mild alkaline solution applied by spray, scrubbed thoroughly with car cleaner brushes and rinsed immediately with fountain rinse brushes. Roofs are also cleaned by this method.

Trucks, underframe and tanks are cleaned by first removing accumulations of paper and weeds. Surfaces are then sprayed with the ready-mixed solvent type cleaner containing an emulsifier. After cleaner is applied, the solution is allowed to soak for at least 10 min before parts are thoroughly rinsed with a sharp spray of water.

Exterior maintenance cleaning of all diesel road locomotives, including sides, nose, windshields, trucks, underframe and tanks is done upon each arrival at the home terminal. Diesel switchers and road switchers are given maintenance cleaning at each regular monthly inspection and more often if operating conditions necessitate. It is not always possible to clean roofs upon each arrival at the home terminal, but roofs are cleaned as frequently as necessary to maintain the desired appearance.

When diesel locomotives require heavy-duty cleaning, the same procedure is followed as has been set up for maintenance cleaning except for roofs and trucks. Roofs are sprayed with the SP's ready-mixed solvent type cleaner and scrubbed with short bristle brushes after soaking for at least 10 min. They are then rinsed with a sharp spray of water. The trucks, underframe and tanks are cleaned in the same manner specified for maintenance cleaning except that the application of solvent type cleaner is followed with steam cleaning, using a solution of alkaline steam cleaner applied by a steam gun. Where available, chemical steam cleaning machines are used for heavy-duty truck and tank cleaning.

Cleaning tools include portable pressure tank with spray guns, hoses, valves and pressure gauge.



Cold tank solution cleaning of sintered bronze filters is followed by rinsing (right) and flow rating (left).

Interior Cleaning

Heavy-duty exterior cleaning is performed as frequently as service conditions necessitate on all types of diesel locomotives. In order to obtain the best cleaning results and to prevent soiling cleaned surfaces, sides and nose of locomotive should be cleaned after roof and truck cleaning has been completed.

The Southern Pacific has standardized on the following equipment for use at all locations where interior cleaning is performed:

(1) ASME code portable pressure tank, complete with spray gun, hoses, valves and pressure gauge mounted on

hand truck equipped with two 10-in. rubber tired wheels.

(2) Washing gun complete with hose and connections.

(3) Air solution syphon gun complete with hose and connections.

(4) Hot water can and solution can.

(5) Water pick-up type vacuum cleaner.

(6) Brooms, mops and wringer pail.

(7) Exhaust fan for mounting in side doorway of units.

Interior maintenance cleaning is performed on diesel locomotives upon each arrival at the home terminal. Cabs are cleaned in the following manner. First, floors are swept. Walls, ceiling, doors, windows, fixtures and exposed surfaces are washed using mild alkaline cleaner applied with damp rag wrung out in the solution. Surfaces are rubbed until dirt is loosened, then wiped dry with another clean cloth. Floors are then mopped with the same solution.

The engine room walls, doors and ceiling, and the engine block, piping, floors, cabinets, fixtures, auxiliaries and other exposed parts are cleaned with the emulsion cleaner, mixed 1 part cleaner to 5 parts water and

These Are the SP Cleaning Materials

MATERIAL	AUTHORIZED USES	MIXING AND USE	PRECAUTIONS
Exterior Cleaner for Passenger Cars Granular acid with rinsing agent and inhibitor pH of Solution: 1.5 SP Color Code: White SP Specification: SP-225	1. Cleaning exterior of passenger train cars. 2. Cleaning radiators.	Normal solution strength: Maintenance cleaning—3 oz per gal. of warm water Periodical cleaning—8 oz (max.) per gal. of warm water Mixing and use: Add cleaner to warm water (not more than 130-deg F) and stir until completely dissolved. Apply by spray or brush.	Wear rubber gloves, approved respirator and goggles if exposed to dust when mixing. Wear rubber gloves and face shield when applying. Avoid contact with skin and eyes.
Heavy Duty Hot Tank Cleaner-Caustic Type Granular Caustic Alkali pH of Solution: 14.0 SP Color Code: Green SP Specification: SP-233	1. Hot tank cleaning and degreasing of equipment parts made of steel or iron only. 2. Cleaning panel type air filters from locomotives and cars. 3. Cleaning interior of steam locomotive tender oil tanks. 4. Cleaning tank car interiors where specified.	Normal solution strength: 4 to 8 oz per gal. hot water Mixing and use: Add cleaner to water at 180-deg F with constant stirring to avoid violent spattering. Under no circumstances pour water on cleaner as violent boiling and spattering of hot caustic solution will result. Immerse parts to be cleaned in boiling solution and hose rinse with hot water or steam. Cleaner is corrosive to aluminum, tin lead, zinc and alloys containing these metals (such as bearing lining).	Contains caustic soda. Burns skin and eyes. Avoid contact with body or clothing. Observe safety precautions. Wear close-fitting cup type goggles, rubber gloves, apron and boots. If working in dust or mist from cleaner, wear respirator of approved type.
Hot Tank Cleaner for Aluminum Parts Alkaline powder with inhibitor pH of Solution: 12.5 SP Color Code: Gray SP Specification: SP-234	1. Hot tank cleaning and carbon removal from aluminum pistons and other aluminum parts except those containing lining metals.	Normal solution strength: 4 to 8 oz per gal. hot water Mixing and use: Add cleaner to water at 180-deg F with constant stirring until completely dissolved. Immerse parts to be cleaned and hose rinse with water and brush with swab after removal. Dry with compressed air. Not safe on part containing lining metals.	Contains caustic soda. Burns skin and eyes. Avoid contact with body or clothing. Observe safety precautions. Wear close-fitting cup type goggles, rubber gloves, apron and boots. If working in dust or mist from cleaner wear respirator of approved type.
Mild Alkaline Cleaner Mild alkaline detergent powder with solvent pH of Solution: 9.5 SP Color Code: Red SP Specification: SP-235	1. Cleaning exterior of diesel locomotives. 2. Cleaning exterior of passenger train cars for removal of oil deposits and maintenance cleaning where specified. 3. Cleaning interior enameled surface in cab and engine room of diesel locomotives.	Normal solution strength: 4 oz max per gal. warm water. Mixing and use: Mix with warm water and apply with brush or spray. Agitate, if necessary. Follow with clean water rinse.	Wear rubber gloves and face shield when applying.

applied by spray. Where necessary, solution on surfaces is agitated with cloth, sponge or brush while still wet and then flushed off with water using air-water washing gun adjusted for minimum amount of water for complete removal of solution and deposits. After completing this cleaning operation, excess water and removed deposits are picked up with vacuum cleaner followed by thorough mopping of floor. Switchers and road switchers have necessary maintenance cleaning performed daily on cabs and windows. Switcher engine room cleaning is done at regular monthly inspections.

Special cleaning is often necessary around engine ends, oil filter, compressor, body frame members, and on the engine room floor and deck where heavy accumulations of oily deposits have collected. The ready mixed solvent cleaner with emulsifier is applied with spray gun connected to portable pressure tank. Before applying the cleaner, covers and other suitable protectors are placed on blower intakes, generator, cabinet doors and around the compressor drive shaft housing to prevent entry of cleaning solution. After cleaner has been applied, sur-

MATERIAL	AUTHORIZED USES	MIXING AND USE	PRECAUTIONS
Type A With Corn Meal Scrubbing Agent TYPE B—HIGH GRADE TOILET SOAP AND BORAX pH of Solution: 9.0-9.8 SP Color Code: None SP Specification: SP-301	1. Hand cleaning.	Mixing and use: For use in dispensers in shop washrooms, and at other locations where installed.	None
Locomotive Cleaner Solvent Type Dark Brown liquid pH of Solution: None SP Color Code: Yellow SP Specification: SP-236	1. Cleaning of diesel engine top deck, air box and crankcase. 2. Maintenance cleaning of truck underframe and tanks under diesel locomotives. 3. Heavy duty cleaning exterior diesel locomotives. 4. Cleaning steam locomotives and tenders prior to shopping. 5. Maintenance cleaning of steam locomotives, including cabs, jackets and tenders.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Diesel Engine Top Deck, Air Box and Crankcase Apply by spray using portable tank with 1/8 in. Vee Jet Nozzle 1506. Air pressure 40 psi. Flush all parts with SP-255 rinsing oil using portable tank with 1/8 in. Vee Jet Nozzle 1506. Air pressure 80 psi. Exterior Steam Locomotives, and Diesel Locomotive Trucks, Underframe and Tanks—Apply by spray using portable tank with 1/8 in. Vee Jet Nozzle 5010. Air pressure 40 psi. Follow with water rinse using sharp water jet.	Diesel Engine Top Deck, Air Box and Crankcase—Wear approved respirator, goggles and rubber gloves. Smoking prohibited. Keep away from open flame. Exterior Work — Wear plastic face shield and rubber gloves. Avoid excessive formation of vapors.
Electrical Parts Cleaner Liquid Solvent pH of Solution: None SP Color Code: Aluminum SP Specification: SP-250	1. Cleaning electrical equipment on diesel locomotives and similar purposes.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Apply by spray with rinsing action on large parts using portable tank with 1/8 in. Vee Jet Nozzle 1506. Brush on small parts. Blow thoroughly with air.	Wear approved respirator, goggles and rubber gloves. Smoking prohibited. Keep away from open flame or electric arc. Shut off engine during cleaning operation. Open all circuits before cleaning. Avoid excessive formation of vapors.
Emulsion Degreaser Light Brown Liquid pH of Solution: 9.5 SP Color Code: Brown SP Specification: SP-300	1. For cleaning exterior diesel locomotives. 2. For cleaning interior diesel locomotives.	Normal solution strength: Exterior diesel locomotives: Maintenance cleaning — 1 part concentrate to 25 parts water. Heavy duty cleaning — 1 part concentrate to 10 parts water. Interior diesel locomotives: Maintenance cleaning — 1 part concentrate to 10 parts water. Heavy duty cleaning — 1 part concentrate to 5 parts water. Mixing and use: Mix with cold or warm water. Apply by spray or brush. Follow with clean water rinse.	Wear rubber gloves and face shield when applying.

Table Continued on page 61

Colors and stencilling for cleaning compound drums are specified by the Southern Pacific.

faces are allowed to soak for about 10 min and then flushed off with water using an air-water washing gun. Careful adjustment of washing gun is necessary at all times to avoid flooding the engine room with water. Cleaning solutions and water must be kept away from electrical equipment.

Electrical Cleaning

For cleaning electrical equipment, electrical parts cleaner is used. The cleaner is applied by jet spray, wiping or immersion depending on the type and location of equipment to be cleaned. No special rinsing, flushing or special removal methods are required except the use of an air blast to facilitate drying. This material when applied in the normal manner of cleaning, will not damage or reduce the electrical insulating value of Glyptal varnish, phenolic varnish, mica, rubber, varnished cambric or sealing compounds.

A special exhaust fan, designed to fit side doorways of diesel units is used during cleaning operations to draw out fumes from cleaning process and provide adequate ventilation. The vapor degreaser method is also used for cleaning traction motors and generators when machines are disassembled at time of general overhaul. The degreasing solvent used is known as trichloroethylene.

Engine Cleaning

Standardized procedures set up for diesel engine cleaning have been based on cleaning General Motors 567 engines, but can be adapted to other types with modifications. Diesel engine cleaning is divided into two classifications:

(1) Cleaning at time of oil change.
(2) Heavy duty cleaning at time of overhaul.

After crankcase has been drained of oil for oil change, cylinder head covers, air box hand hole covers, and oil pan hand hole covers are removed. Entire top deck, including cylinder heads, camshafts, rocker arms and other parts are sprayed with our ready-mixed solvent type cleaner by means of spray gun connected to portable pressure tank. Safety precautions must be observed to avoid the formation of vapors and the possibility of fire or explosion.

Spraying is commenced at front end of top deck continuing to rear end, then from rear end to front end on opposite side of the engine. On return to starting point, the spray is then directed through crankcase hand holes in same manner as top decks were sprayed. This cleaning operation is repeated two or three times if necessary to loosen sludge and deposits. Airboxes are not sprayed. After deposits are loosened satisfactorily, all parts being cleaned are flushed off with a high-flash petroleum distillate using the same equipment except a flushing nozzle is substituted for the spray nozzle. The same sequence is followed in flushing as in applying the solvent. Excess solvent is removed from drain trough and crankcase with a syphon gun and surfaces are wiped with wiping rags to remove any traces of sludge or deposits remaining from flushing operation. Air boxes are hand wiped, using rags.

Heavy duty cleaning at time of overhaul is performed, after cylinder assemblies are removed, in the same manner as at time of oil change. Prior to spraying the surfaces with cleaning solvent, all heavy deposits of sludge and carbon are removed as far as possible with putty knives. The air boxes also are sprayed and cleaned with the solvent type of cleaner.

When engines are removed from locomotive for complete overhaul, crankcase liners, heads and valves are cleaned in heavy duty alkaline hot tank solutions followed by thorough rinsing with syphon steam guns or steam cleaning machines. Internal diesel engine parts such as connecting rods, bearings, pins and bushings are cleaned in the cold tank cleaner solvent type. Aluminum pistons and parts are cleaned in an inhibited hot alkaline cleaner followed by complete and thorough rinsing.

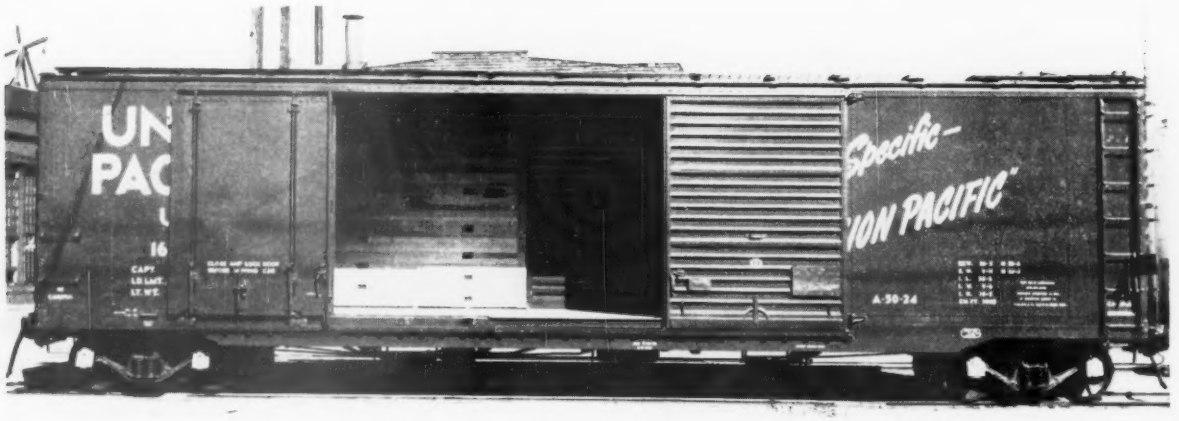
A fast and thorough method for cleaning brush holders, contractors, reversers, cam switches and other electrical parts made primarily from brass and copper has been standardized. This employs the SP-291 cold tank cleaner which contains a brightening agent. The equipment consists of a covered tank for suspension of the parts to be cleaned. Perforated air lines are located in the bottom of the tank from which air is emitted to produce a turbulent agitation of the liquid. When parts are removed from the tank they are rinsed with an air-water washing gun and blown dry with compressed air. After cleaning, the brass and copper portions of the assemblies have a very bright appearance with all deposits of carbon and grease removed.

Methods Supervised

At all points where cleaning is performed, cleaning operations are followed up and supervised from time to time by members of the engineer of research and mechanical standards staff. This practice of follow-up and supervision results in uniform cleaning procedures at all terminals.

Many benefits have been realized by good housekeeping on diesel locomotives. Fire hazards from excessive accumulations of oil and grease on exposed surfaces are reduced. Better and more thorough inspection and maintenance is possible. The possibility of failures from dirty operating parts is reduced. All of these contribute to improved performance from diesel motive power.

MATERIAL	AUTHORIZED USES	PRECAUTIONS	MIXING AND USE
Scale Remover—Acid Type Liquid inhibited acid (furnished in carboys) pH of Solution: None SP Color Code: None SP Specification: SP-238	1. Removing scale from interior of coils in steam generators on diesel locomotives. 2. Cleaning engine radiators and cooling systems on air conditioning units. 3. Heavy cleaning of toilet bowls and dental bowls.	Normal solution strength: Scale Removing—1 part per 3 parts of water or as required. Cleaning purposes—1 part per 10 parts of water or as required. Mixing and use: Circulate with pump for removing scale in steam generator coils on diesels and in air conditioning engines. Apply with brush for hand cleaning. Flush thoroughly.	Inhibited acid. Avoid contact with skin. Wear goggles, rubber gloves and apron. Observe all safety precautions.
Rinsing Oil Liquid Solvent pH of Solution: None SP Color Code: Dark Blue SP Specification: SP-255	1. Flushing interior of diesel engines at time of oil change or overhaul.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Apply by spray with rinsing action after using cleaner SP-236. Use portable tank with 1/8 in. Vee Jet Nozzle 1506.	Wear approved respirator, goggles and rubber gloves. Smoking prohibited. Keep away from open flame or electric arc. Avoid excessive formation or vapors.
Cold Tank Cleaner Solvent Type Dark Brown Liquid pH of Solution: None SP Color Code: Gray SP Specification: SP-291	1. Cleaning of internal diesel engine parts. Do not use for removal of hard carbon or water scale.	Normal solution strength: Use full strength as furnished. Do not dilute. Mixing and use: Cleaner is used full strength in air agitated tank. Immerse parts to be cleaned in solution and rinse with cold or warm water. Use air water gun. Blow dry with air. Dip parts as soon as possible in water-replacing, rust-preventive oil to prevent corrosion.	Wear goggles or face shield, rubber gloves, apron.
Liquid Detergent Clear Liquid pH of Solution: 8.2 SP Color Code: Black SP Specification: SP-297	1. Cleaning complete interiors of passenger cars. 2. Cleaning upholstery, rugs, portieres, window shades and drapes.	Normal solution strength: Interior passenger cars—Painted surfaces, stainless steel, leather, plastic: 2 oz concentrate to 1 gal. water. Rugs, upholstery, drapes, window shades: 8 oz concentrate to 1 gal. water. For heavier cleaning, proportion determined by degree of soil on surfaces to be cleaned. Mixing and use: Mix concentrate with water as specified. Apply with sponge, cloth, brush or spray. Follow with clean water rinse. When used on interior of passenger cars, wipe surface dry.	None
Steam Cleaner—Alkaline Type Alkaline Powder pH of Solution: 12.5 SP Color Code: Light Blue SP Specification: SP-237	1. Maintenance steam cleaning of trucks and running gear, tanks, and underframe on steam and diesel locomotives and passenger train cars, where specified. 2. Maintenance steam cleaning of connecting rods, crossheads, and motion work on steam locomotives where alkaline cleaner is specified. 3. Cleaning exterior of passenger train cars prior to repainting Class 7 repairs. 4. Cleaning floor racks in car equipment. 5. Cleaning exterior of box cars, not blasted, prior to repainting.	Normal solution strength: 4 oz max per gal. hot water. Mixing and use: Mix cleaner in hot water. Apply by brush spray, steam gun or chemical steam cleaning machine. Brush if necessary. Follow with water rinse using sharp water jet.	Wear rubber gloves, approved respirator and goggles if exposed to dust when mixing. Wear rubber gloves and face shield when applying. Avoid contact with skin and eyes.



Plug doors were applied to this Union Pacific 50-ft box car; 500 more cars with this door arrangement are being built by the UP.

Plug-Door: Solution For All-Purpose Box Car

GN, SP and UP are all working with design recently given nod by AAR car committee.

Plug door operating mechanism is the same used on late refrigerator cars. SP has on order 2,900 cars of this type.

A general purpose 50-ft box car, having two wide, staggered openings, one on each side, offers one solution to the growing demand for a universal car to handle not only mechanized and palletized loading, but also bulk shipments, without additional expense.

Working in cooperation with the railroads and shippers, the Youngstown Steel Door Company developed this "double door" arrangement—one 8-ft sliding "plug" door and one 8-ft conventional sliding door. Doors work independently to give a 16-ft opening on each side.

The conventional corrugated door is supported for movement by a plate track, which also supports the sliding plug door.

The plug door, based on a design primarily for refrigerator and insulated box cars, consists of a metal panel reinforced with structural members.

The desired thickness of the door is obtained by wooden members so that it is flush with both inside and outside of the car when seated in the door opening. The plug door is equipped with the Camel screw type door mechanism, which serves to

shift the door laterally into and out of the door opening, and to support the door for movement along the track. When closed, the flush door fastens securely to the car wall, providing an efficient seal.

The front edge of the flush door is overlapped by the sliding door so that the latter serves to brace the flush door against the outward pressure of loading within the car.

The locking mechanism at the flush door has an operating lever so arranged that a grain door cannot be nailed to the sliding door, and the sliding door cannot be closed unless the front edge of the flush door is properly locked. In a closed position, the sliding door prevents movement of the lever of the locking mechanism of the flush door, thus preventing its opening.

Wide Doorway

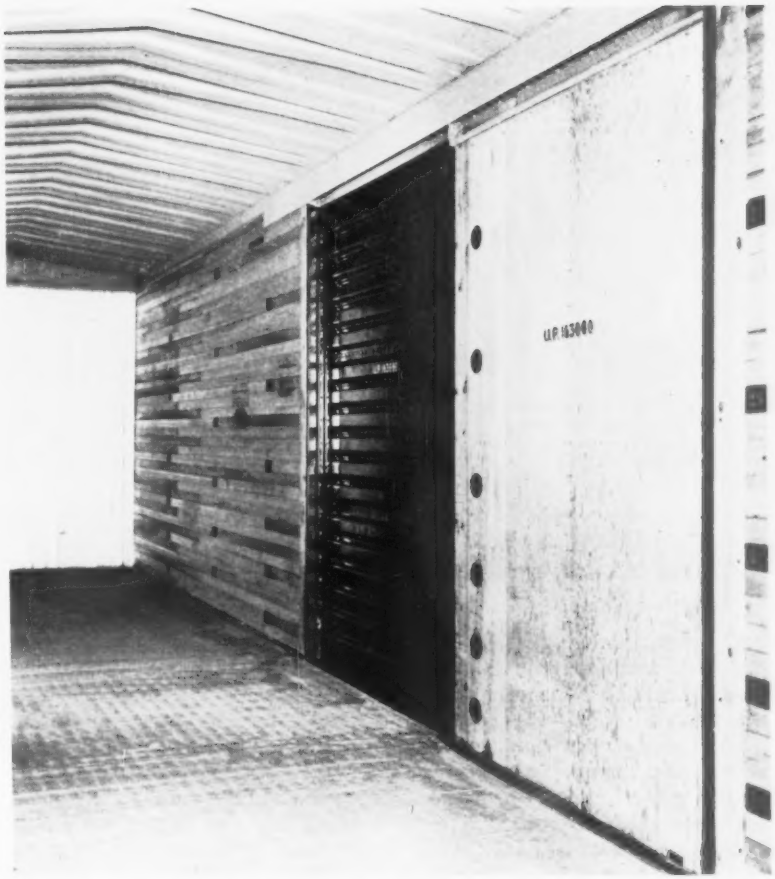
With both doors open, the 16-ft opening provides ample space for maneuverability of mechanized equipment in loading and unloading packaged and bundled materials or palletized commodities.

When used for grain loading, with the flush door becoming an integral part of the car wall, protection is necessary only on the inside of the 8-ft sliding door, making the cost of dunnage the same as on a single door box car.

The AAR's Committee on Car Construction gave the wide door design a favorable nod recently when it suggested that railroads contemplating ordering new box cars should examine the 16-ft staggered door arrangement to see if it will meet their needs. Furthermore, it is suggested that by concentrating on a door arrangement of this size, cars of this type can be built at less cost. The committee said it also considers it desirable to maintain the principle of one plug type door and one sliding door on each side.

Three railroads have some 3,500 cars of this type on order, the SP with 2,900 from company shops, and the UP with 500 under construction at Omaha. Twenty-five UP cars are in service.

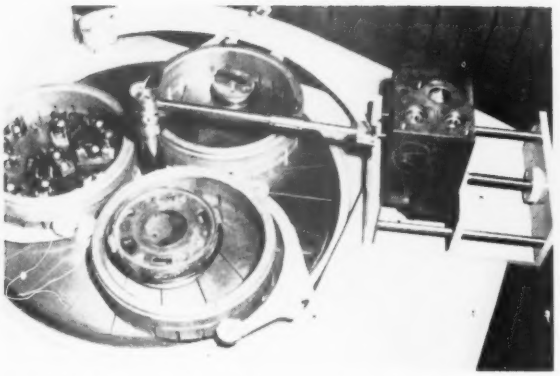
The GN has five experimental cars in test service. These cars are 40 ft long, with a 6-ft plug door and a 6-ft conventional sliding door on each side, providing a maximum opening of 12 ft.



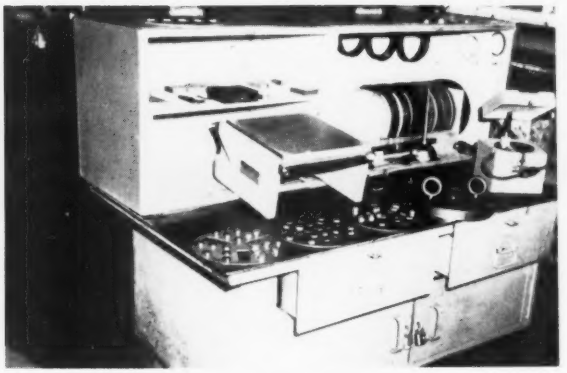
Plywood lining and strap anchors are applied to inside of plug doors on UP's 50-ft box cars. The doorways are staggered.

Great Northern made plug-door application on 40-ft box car. Doorways are staggered across the car on this type also.

While the western railroads have been first to adopt this design of car, AAR people feel that it is in no sense a "regional car," but one that is adaptable to all parts of the country.



Rubber O-rings are put around some parts to protect them as they roll within the rings. Purpose of the rolling motion induced by the rings is to improve the lap, to prevent wearing a path in the table, and to condition it.



Storage bench holds over a dozen container pieces for different types and groups of small parts, polishing board, and optical flats for measuring trueness of finished surface. The weight between the parts and flats covers a plateful of small parts.

Lapping Operations Speed Up Output

Lapping air brake, air compressor and some small diesel parts by machine instead of by hand has led to savings in two ways—(1) a quantity of parts are lapped simultaneously in less time than one piece can be lapped by hand, and (2) badly worn parts can often be reclaimed economically, whereas by hand the cost would have been so great that it was often cheaper to scrap the part.

The machine used is a 24-in. Lapmaster. Principal items handled are slide and rotary valves from both car and locomotive brake equipments, and the inlet, outlet and intermediate valves (all spring loaded type) on all models of driven compressors. Theory of the machine is that it puts a virtually perfect flat surface on a part—thus if two mating surfaces are finished on the machine they will be automatically lapped together when assembled the same as if one surface had been hand-lapped direct to the other.

It normally takes 12-15 min. to recondition a group of valves (typical combinations are shown in the machine photos — some of many other possible groups are the three on the bench). While this work is being handled on the table, the shaft drives a rod through an eccentric mounting to move a hone back and forth over the slide valve seat in the brake valve.

The first step in reconditioning a valve that does not pass the test rack after cleaning is to hand stone the slide valve and its seat. In somewhat over half the cases, the valve will then pass the test. When it does not, the valve is stripped and the slide and rotary valves lapped on the machine. No attempt is made to keep parts of any brake valve together. Parts are mixed indiscriminately and lapped in groups like those illustrated.

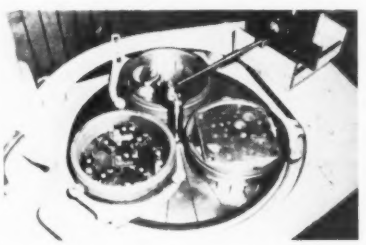
When the machine has completed the lapping, the valves are flat but have a dull finish. For checking their flatness, they are rubbed lightly on a polishing plate containing jeweler's rouge, then checked by optical flats.

Slide valve seats are lapped indirectly with hones through an eccentrically mounted shaft. Two steel hones and one bronze hone are used—each for four minutes. The one 12-min. cycle completes the emergency slide valves. The service portion slide valves require two 12-min. cycles because no weights are added during the lapping. The hones are conditioned on the table before each usage. This is usually alone while an alternate hone is conditioning the seat.

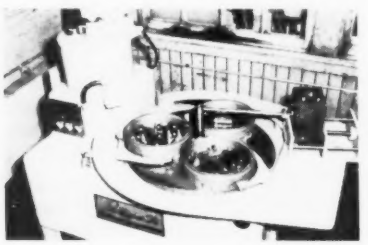
Large as well as small air brake parts are handled on the machine. Rotary valves, which formerly took 1-2 hr by hand, are done 1½ at a time plus some small parts.

The same grinding compound in the same proportion (4 oz per gal oil) is used for honing the seats as well as for conditioning the hones and other lapping operations on the table. The grinding compound mixture is fed to the table down a wire. Paddles keep the solution mixed in the reservoir until use. Two different rates of flow are attained by two sizes of orifices. The used oil is caught in a bucket and discarded.

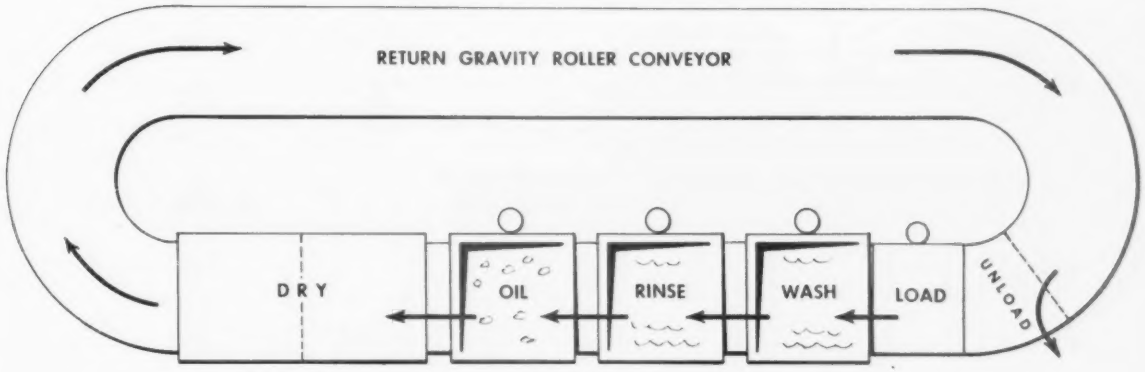
A larger (72-in) Lapmaster is contemplated for the diesel shop to lap the joints on Alco and EMD where the heads fit to the liners and to the engine block.



One ring has four circular sections milled out to accommodate a D-24 control valve. The balls from an old bearing in the second ring add weight to reduce the lapping time on emergency slide valves.



While three groups of small parts are being lapped, a hone on the end of the eccentrically connected rod laps the slide-valve seat. A second arm will permit two such seats to be lapped at the same time.



A general arrangement of the equipment is shown in addition to the movement of the filters being processed.

Filters Cleaned . . . While You Wait

The Elizabethport (N.J.) diesel locomotive shop of the Central Railroad of New Jersey reports economies from a recently installed automatic filter cleaning machine. The equipment, designed and built by Magnus Chemical Company, is known as the Magnus Automatic Filter Dip. It washes, rinses, oils and dries, or "cures," diesel locomotive air filters.

The technique involves handling the filters in baskets. Full immersion is employed in each step, in addition to an up and down mechanical agitation of the pieces in the various solutions to speed up the cleaning action. The Jersey Central installation completes a cycle of one batch of filters in 75 minutes.

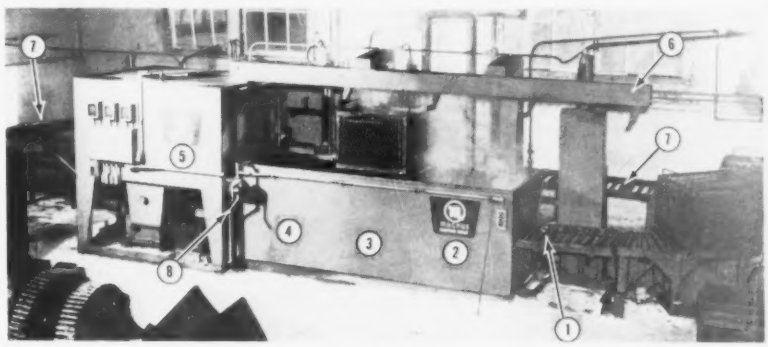
Sequence of Operations

After loading of the dirty filters in the basket, it is automatically moved to the cleaning solution tank. This tank contains a solution of Magnus Super JR cleaner heated to about 190 deg F. The filters are agitated up and down 80 to 100 times a minute for up to 30 minutes. This stage combines chemical and mechanical forces to cut out the accumulated dirt.

The conveyor transfers the cleaned filters from the cleaning tank to the rinse tank. Here again, vigorous up and down movement is combined with a scalding hot water rinse. After this rinsing they are automatically conveyed to, and completely submerged in the oil bath to insure a thorough coating of the filters. Emerging from the oil bath, the filters are permitted to drain and are then transferred automatically to a two-stage, steam heated dryer. Any dripping that persists is carried to a pan in the first stage of this final operation. A roller-gravity run returns the finished batch to the point of origin. This self-return feature was included to permit one-man operation of the entire machine.

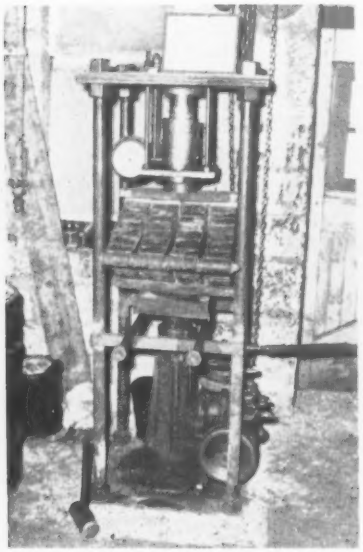
There are 22 to 30 filters on every diesel locomotive on the Jersey Central roster to be cleaned every month. This machine is designed to process up to 96 filters an hour. Under the old method of immersion in a still tank, only 30 to 40 could be done in the same period. Being a manual operation, the charge to labor was necessarily high. More important was the fact that the former method was not cleaning the filter adequately. An indication of this fact was that during the first few weeks that the Magnus machine was put into use, nearly a foot of sludge accumulated in the bottom of the cleaning tank each day. As filters cleaned by the old method were finally eliminated, the sludge level dropped.

It was decided, from actually using this machine over a period of several months, that the cleaning solvent solution should be changed after each day's use. The oil bath level is merely maintained by a hand pump as required.



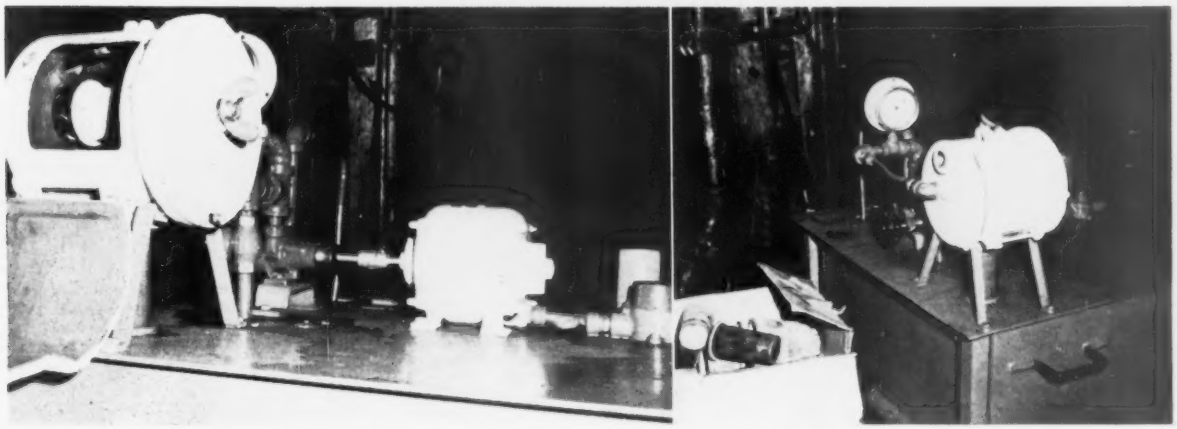
Briefly described, (1) is the level loading platform from which a basket is picked up and deposited into the wash or cleaning tank (2). Basket is shown suspended over the rinse tank (3). From here it is transferred to the oil bath (4) and ultimately to the dryer (5). Movement is effected by the portion marked (6) or transfer mechanism. The roller gravity conveyor run (7) returns the baskets to point of origin (1). Hand-cranked oil pump (8) is adequate to maintain a proper oil level in tank (4).

Ideas for the Diesel Repair Man...

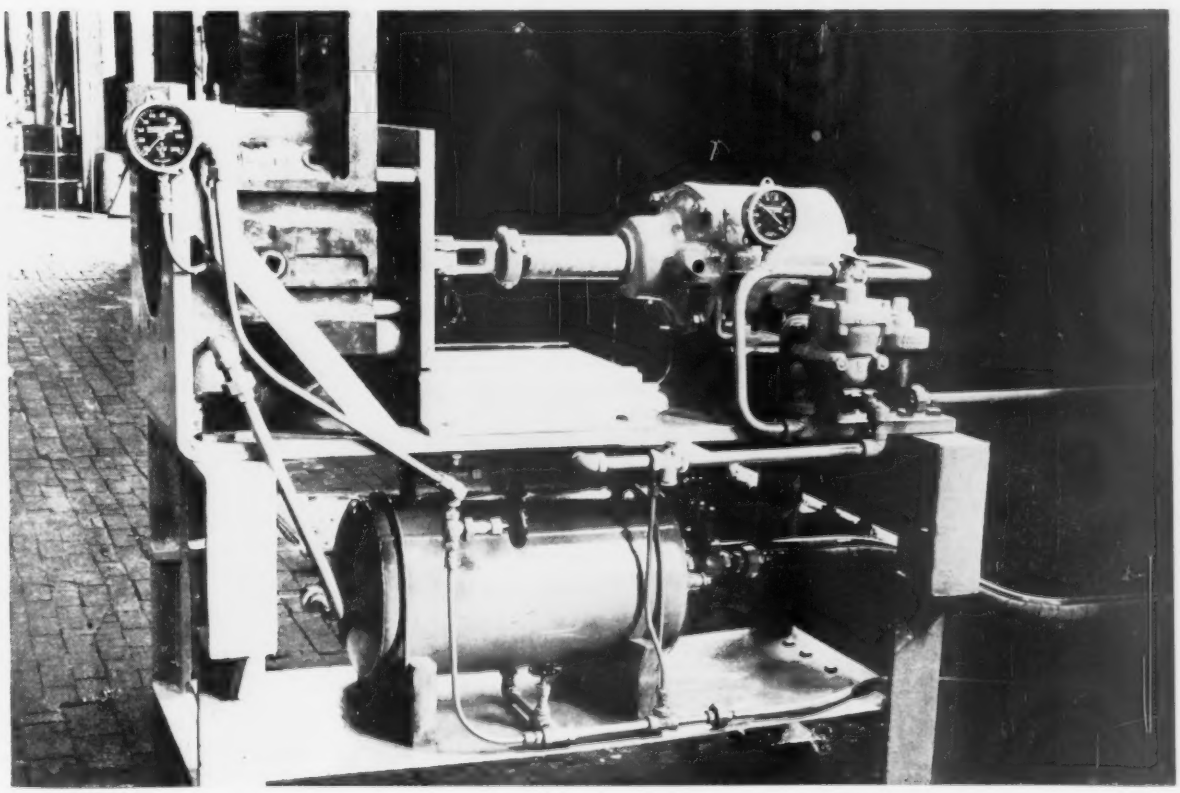


The GM&O tests diesel locomotive (and passenger car?) springs each time the trucks are rebuilt. Both elliptic and coil springs are checked in the above unit in which an air jack compresses the spring up against a hydraulic cylinder. The gage connected to the cylinder is calibrated to indicate directly the pounds of force on the spring. Conditions checked for each spring are the deflection at maximum load and the load required to make the spring go solid.

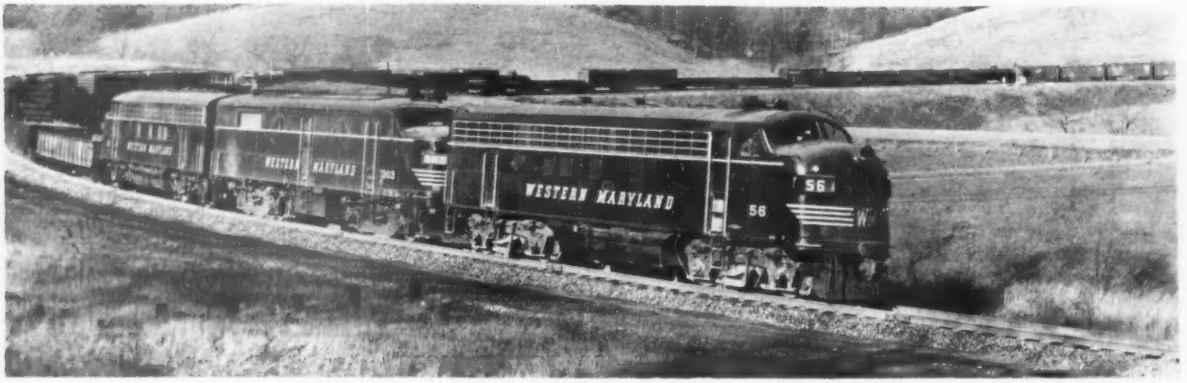
Three operations on Alco cylinder assemblies are performed on this small bench (left) liners are pressed in; (center) bearings are miked; and (right) rods are checked with feelers for being high, low or twisted.



Sintered bronze fuel filters are cleaned in 2 min. by this arrangement. The filter is attached (left) to a common shaft with an air turbine which spins it at 10,000 rpm with the loading door closed (right). Filtered fuel at 40 psi is supplied to the chamber by the separate motor-driven pump. The combination of the pressure and the centrifugal force forces the fuel through the pores from the inside out (with steam the water clogs the pores). The fuel enters through the piping in the center. Air to spin the turbine (at 90 psi) is supplied by an air hose through the threaded hole near the top.



Alco cylinder-head test stand provides a quick method of checking for water leaks. Water in the tank on lower shelf of the stand is heated with steam to about 190 deg F. and is circulated through the head until it is nearly this same temperature. The air cylinder holds the head against blanking plugs fitted with standard grommets. Air pressure applied to the hot-water tank is 90 psi.



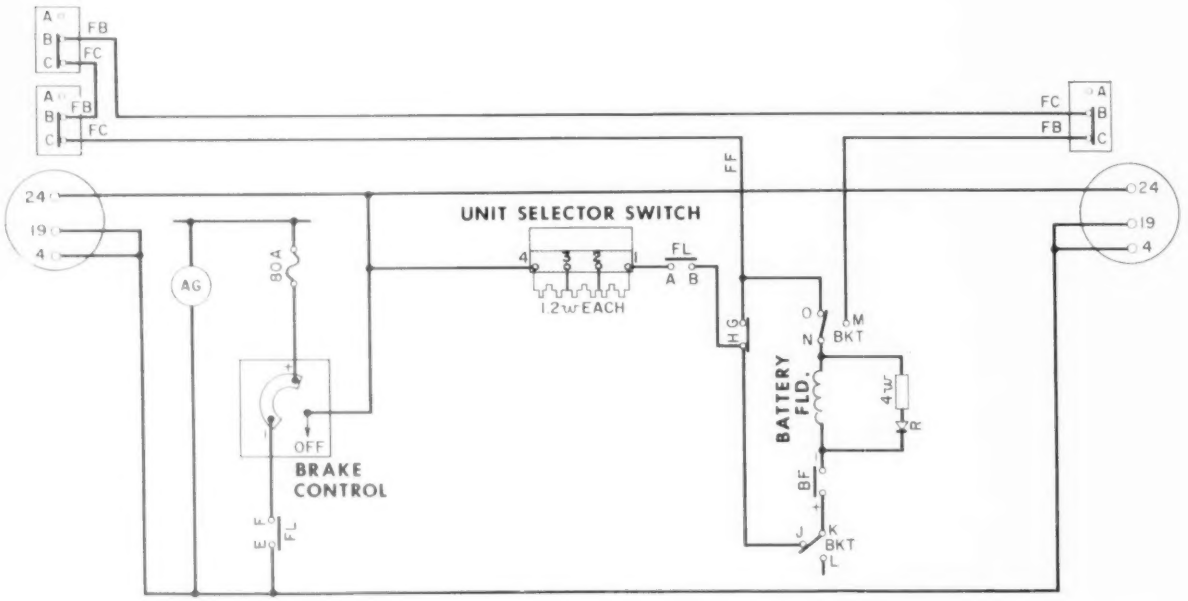
All in dynamic braking, three A units—one Alco and two General Motors—descend into Cumberland, Md.

Western Maryland Ups Locomotive Utilization . . .

Alco and EMD Units Run M-U

LOCOMOTIVES which are frequently not very symmetrical, but always very practical, are made possible by a Western Maryland program which now enables any combination of its Alco and EMD road freight and road switcher units to operate together. A big step was taken when all the A units received full sets of air and electrical trainline connections at the nose end. This operation cost less than $2,000 per unit and, according to the WM, the money was well spent.

The Western Maryland has found



Dynamic braking on General Motors locomotives is current sensitive, but this arrangement makes Western Maryland EMD units activate Alco braking.

some problems which have to be considered in a program of this type. A large number of the Alco contactors are solenoid-operated as contrasted with the air-operated magnet valves of the EMD units. This requires heavy currents through trainlined circuits and can result in overloading of the EMD wiring when several Alco units are in the locomotive consist. This problem has been solved by paralleling unused wires in the EMD 27-conductor trainline with each of the following: negative (*4*), generator field (*6*), and pneumatic control or PC (*13*). At the same time, the alarm and signal circuits of the Alco units are designed for lighter currents than are developed on EMD units and can be the source of occasional relay contact difficulties on Alcos.

The difference in the loading characteristics of the two locomotive control systems produces an m-u operation which must be watched during train starting, according to the WM. Controlling or slowing trains is a problem which the Western Maryland has solved with additions to the basic dynamic braking circuits of each builder. Briefly, the basic Alco system is actuated through the amplidyne excitation circuits on each unit with variable voltage from the lead unit. The basic Electro-Motive dynamic brake relies on varying the current from the lead unit through the field loop for battery field excitation of all the units in the consist. This means that the basic Alco system is designed to handle only a few milliamperes and that the basic EMD system must handle currents up to 14 amps. These high EMD excitation currents have required the use of a field loop circuit with heavy-duty trainline connectors. Alco dynamic braking currents can be handled through the standard multiple-contact m-u plugs.

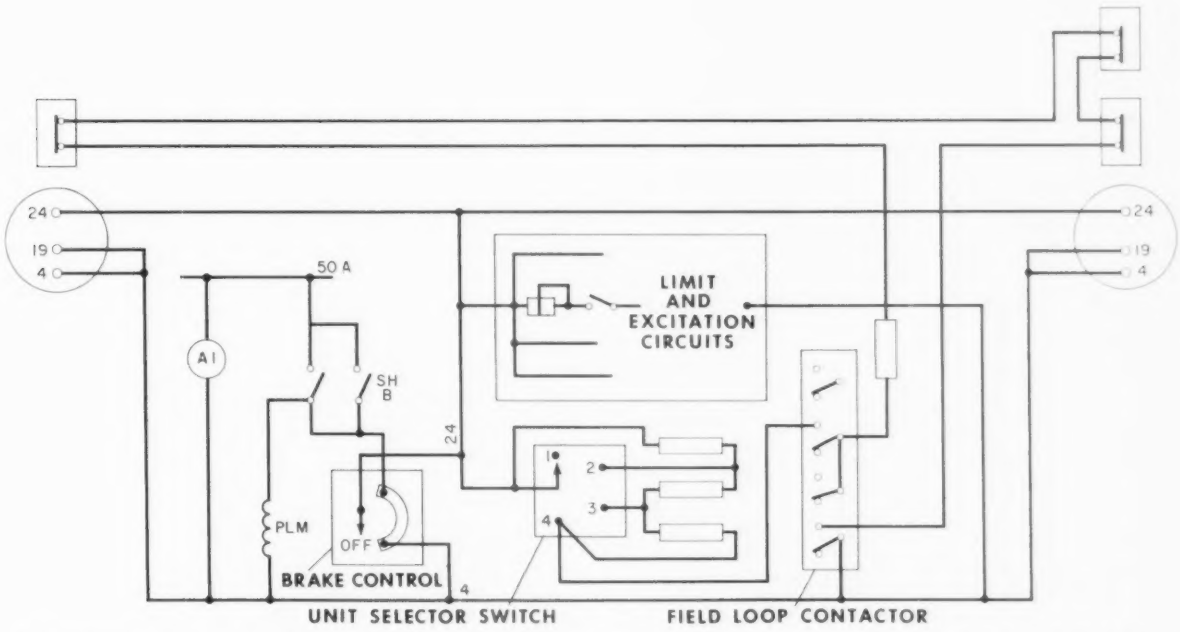
Here then was the WM problem. To be completely compatible and to allow complete freedom of operation, the system would have to be arranged so that either an EMD or Alco unit could be in the lead, and so that it could actuate and control any and all trailing units. The solution on the WM has been the installation of field loop circuits on all Alco locomotives and the assignment of the *24* wire in the 27-conductor trainline of all units to dynamic brake operation.

Alco cab units also were equipped with the EMD unit selector switch and with an EMD field loop contactor assembly. In the field loop of each Alco unit is a resistor which duplicates the resistance of the EMD battery field circuit. The basic dynamic brake controller rheostat on the Alco cab unit has been replaced with a heavier type capable of handling the higher field loop currents.

What does all this produce? Assume that an Alco unit is leading. The dynamic brake is activated by moving the selector handle to the *Braking* position. This causes current to flow through the *17* wire and puts power circuits on EMD and Alco units into the dynamic braking position. Moing the transition lever into the *Braking* range feeds variable voltage through the *24* wire to the excitation and limit controls of all trailing Alco units. The leading Alco unit and all trailing Alcos are then excited through their amplidyne control systems. At the same time current flows through the field loop circuits and provides the excitation for all the trailing EMD units. Each Alco is equipped with a resistor in its field loop equivalent to the resistance of the EMD battery field circuit, and this makes it possible to use the selector switch on any leading unit and set it for the actual number of units without any corrections for type of locomotive.

If an EMD unit is in the lead, it feeds the field loop to operate its own, and all trailing EMD dynamic braking systems. At the same time it feeds the *24* wire to operate trailing Alco units in dynamic braking.

(*Continued on page 74*)



Voltage-sensitive Alco dynamic braking on Western Maryland was arranged to supply excitation current to trailing General Motors locomotives.

2 Roll Them Out Like New

Importance of Proper Handling In Shipping Equipment

Don't kill the patient on the way to the hospital!

THE FIRST STEP in a repair program is to get the job to the shop. This sounds simple enough. But woe betide the equipment that has to be removed from its safe, snug position in the locomotive. Handling and moving exposed equipment can be the most hazardous time of its life—especially if the equipment has already failed. It is like first aid to an accident victim. Well-meaning but careless handling can cause more harm than the injury itself. Remember—"Don't kill the patient on the way to the hospital"!

Handle With Care

As an example, take some sturdy item like a traction motor. Mounted in the truck under the locomotive it is subject to severe punishment. Yet for thousands of miles it does its work through heat and cold, wet and dry. Then comes the day when it is removed for overhaul. What happens to the axle caps? Are they knocked back and forth with a sledge until they crash to the floor and are then forgotten? Be sure they are sent to the shop with the motor to which they belong. The axle caps are machined with the motor frame and wear with it, so they should be checked and repaired together.

What is done with the suspension bearings, wicks and springs? Although these parts are husky they can be bent, twisted or dented by careless handling. Then they must be replaced or repaired. A misplaced blow from a sledge can dent and crack the oil chamber of the axle cap. It must then be welded to pass shop inspection. In the process it may be distorted. That means more work to correct it. All this needless time and effort is the price exacted by one faulty blow!

A motor removed from its axle no longer has the protection of the driving wheels. The end of the shaft is now exposed. A sharp endwise bump on the pinion can break out the thrust flange of the commutator end bearing, as shown in Fig. 1. This can occur either during installation or removal of a motor. The damage is hidden, so the motor may be sent out—only to have a bearing failure on its first trip. The chances for such a bump are ever present. It may happen when the motor swings in crane hooks, or when it shifts during shipment; even when it sits in storage another motor or wheel and axle can be swung against it. For this reason a pinion guard, see Fig. 2, should be applied as soon as possible.

Cables are probably more easily damaged than any other motor part. Again and again a motor is set down on its own cables, Fig. 3, smashing the terminals and cable insulation. Before a motor is moved, the cables should be carefully coiled up and secured out of harm's way, as shown in Fig. 2. Renewal of damaged cables is a big job. The armature must be removed and the cables disconnected from bolted or brazed field coil terminals. New cables must be installed and everything put back together again. It's a pretty expensive task—all caused by a moment of carelessness or haste.

When separated from its air duct connection, a motor is wide open for trouble. An amazing assortment of nuts, bolts and cotter pins can drop into the ventilating opening on top of the frame—and on awfully short notice too! Now suppose the armature is turned, perhaps to remove a pinion. A loose object can quickly wedge itself between a brush holder and the commutator. There it plows a deep groove in the commutator surface, as shown in Fig. 4. To correct such damage the commutator may have to be turned, throwing away years of useful life. A sheet iron cover, Fig. 2, should be snapped or bolted over the air opening as soon as

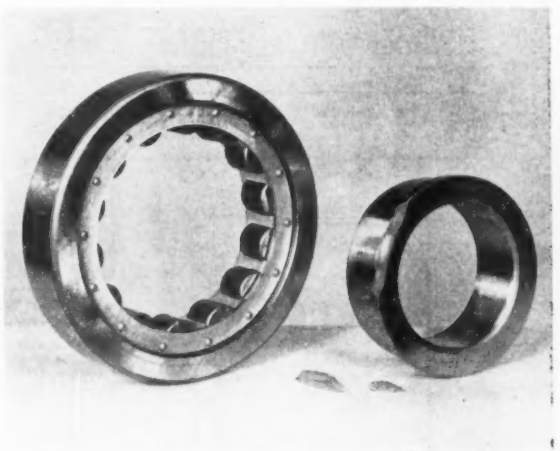


Fig. 1—Commutator and bearing with damaged thrust flange.

This is the second article in a new series covering heavy maintenance of locomotive electrical equipment.

By J. W. Teker, Locomotive and car Equipment Department, General Electric Company, Erie, Pa.

it is exposed. This simple precaution should be taken regardless of the reason for the motor change-out. To be effective the cover must be applied at once and left on until the motor has been installed in the locomotive again. Don't remove it until you know there are no loose objects in the locomotive air duct. This kind of caution pays off handsomely.

Another thing, when in service a motor is heated during operation. This helps keep the interior dry. Also, a powerful blast of air sweeps over the insulation surfaces and out of the frame vents. This helps keep grit and water from entering. The gear grease protects the pinion and shaft against rust. When the pinion is removed from a change-out motor and placed on the shaft of the ingoing motor, the shaft of the change-out is exposed. Even though a mechanical guard is placed over the shaft to ward off nicks and bumps, it is no protection against rust. The precision-machined, tapered surface of the pinion fit can be quickly ruined by rust unless it is slushed or otherwise protected. The same applies to all exposed machine fits, such as shaft extensions; bores of gears, pinions and pulleys; couplings and register or rabbett fits.

Many good rust preventive products are commercially available. Each has its good features. Some are long-lasting, others are easy to remove. There are treated wrapping papers that give off rust-preventive vapors. Even slight moisture on the part absorbs these vapors thus stopping rust. The vapor reaches out to protect irregularities, such as threaded parts, not in actual contact with the paper. Moisture-absorbing crystals are also available for this purpose. Where the vapor method can be used, you don't have to clean off slush to use the part. In making your choice, check with your laboratory and shipping people to find what is best suited to local conditions and experience.

Mechanical parts, as well as electric machinery, are liable to damage in handling. Take the frequently handled item of wheels and axles as an example. These are often nested or staggered as shown in Fig. 5a. In this way they occupy the least space, so more can be placed in a car for shipment or stored in a given space. This is good; but beware of the wheel flanges striking the next axle. If they do, they can put a bad dent in the motor suspension journal surface of the axle, Fig. 5b. This dent is hard to remove without remachining the axle to a smaller diameter. Close examination of such a dent, Fig. 5c, shows that the bottom is below the journal surface. The edges, however, where the metal was pushed out from the depression, are raised above the surface.

So, in addition to a depression that will not carry load, you have a raised bump that will score the bearing and wipe out bearing surface. Really, the bump does more harm than the dent. If an axle is dented just before a motor is assembled on it, the harm may go unnoticed. Then the suspension bearing is in for a rough trip. Is it any wonder that this newly overhauled motor should have trouble on its first trip?

One way to protect an axle from denting is to wrap a layer of wood slats, Fig. 6, around it as soon as possible. These can be secured to a belt arranged to buckle or tie on. Another way is to set the wheels in notched retainers which space them so they cannot touch the next axle. A combination of the two is best. Then the axle is protected in both handling and storage. Remember, this important bearing surface must also be protected against rust. The wooden slats may ward off bumps, but they also collect moisture. This makes a fine setup for rusting. A good procedure is to wrap rust-preventive paper on the axle before applying the slats. After all, this is an exposed piece of machinery no longer protected by the bearings. It is just as easily damaged as the journals of a diesel engine crankshaft. For some reason it is hard to think of an axle this way; probably because it keeps close company with the wheels that do not need protection.

Now the first handling is over, but the machine is not yet out of danger. Next it is going to be taken for a ride in a truck or railroad car. Both make sudden stops

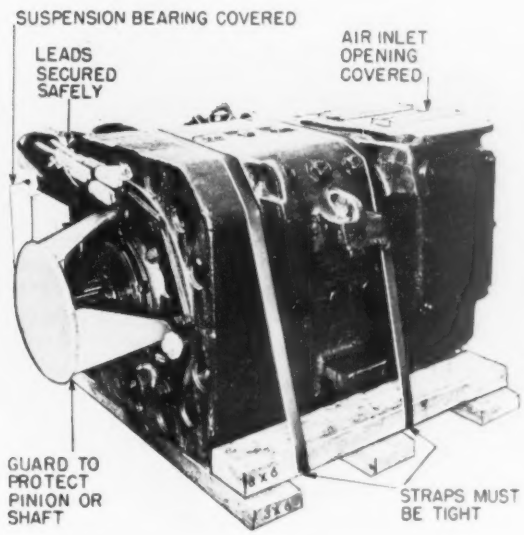

SUSPENSION BEARING COVERED
LEADS SECURED SAFELY
AIR INLET OPENING COVERED
GUARD TO PROTECT PINION OR SHAFT
STRAPS MUST BE TIGHT

Fig. 2—Traction motor protected for shipment.

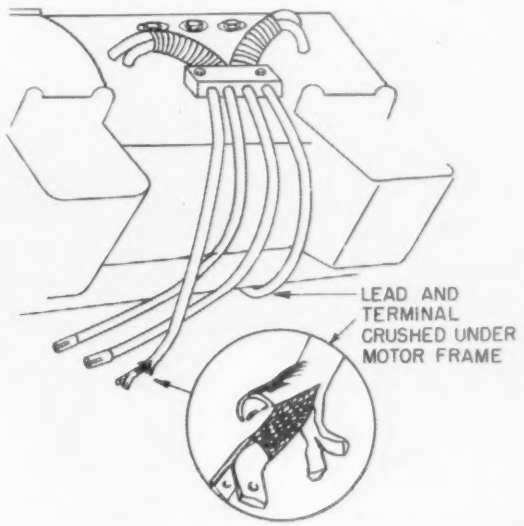


Fig. 3—Traction motor leads left hanging loose are subject to damage.

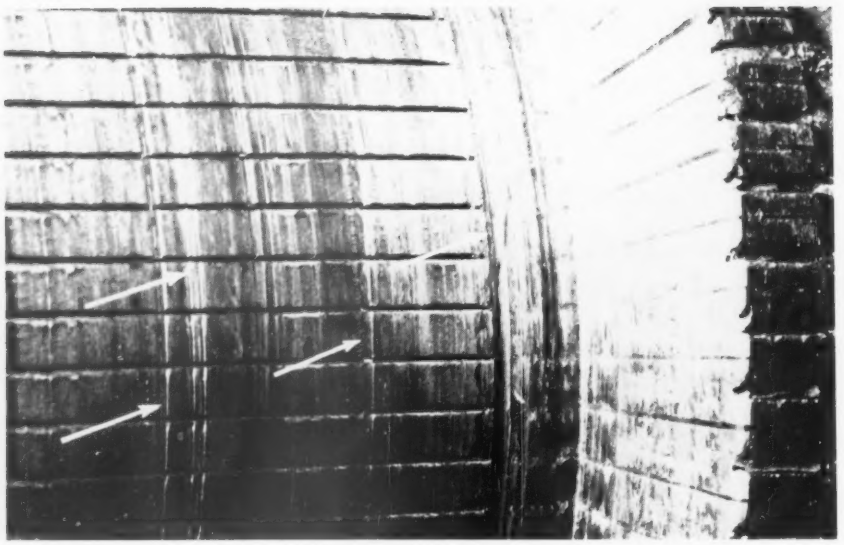


Fig. 4—Commutator gouged by foreign objects wedged under brush holder.

and starts. Both are jolted, as in humping or coupling. Such shocks can be damaging. For instance, let's think of what might happen to a traction generator. Such machines are generally rather high for their base, something like a floor lamp. When coupled to its engine, a generator will survive a collision. By itself, however, it is not much better than the lamp—the first hard jolt will topple it over. Such a fall is disastrous. A machine that was on its way for a needed cleaning must now be rebuilt. Here it's certainly true, the bigger they are the harder they fall.

Safeguard the Shipment

An experienced shipper takes into account the shape, and compares the height and base of a machine. As a "rule of thumb," the base should be longer than the height. When the base is narrow, as with some traction generators, a suitable skid, Fig. 7a, must be used. Experience has shown that generators 5 to 6 feet in diameter should be mounted on skids 8 feet long for rail shipment. For truck shipment 7-foot skids may be used. In case of doubt, refer to the builder's instructions for shipping information.

Skid timbers must be of adequate size and, preferably, bolted together. Remember that green or wet timber will shrink upon drying. This may leave the fastenings loose. Don't underestimate the terrific force of an impact on a heavy machine. Be sure to use positive fastenings, like bolts and nuts. Use large diameter washers to spread the load so the nuts or boltheads will not pull through the timbers. Secure the machine to the skids with bolts through its base or feet. If this is not possible, use care in securing fastenings to other parts of the machine. Bend $\frac{5}{8}$-inch rod into "U" bolts with threaded ends, Fig. 7a, and shape them to go around at selected points. To avoid damage stay away from insulation, terminals or delicate parts.

Load the shipment with the long way of the base in the direction of travel since this is usually the direction of the impact. Even traction motors have been known to roll over under impact. You see, most motors are octagonal (8-sided) so there isn't much base on the bottom of the frame. Therefore suitable skids, Fig. 2, to increase the base length are in order.

Skids are also handy if rollers are used to move the shipment. When building skids, keep fork lift trucks in mind and leave enough space for the fork arms to get under the load.

Finally, don't fail to block or otherwise secure the shipment to the car floor. The long skid base may prevent a machine from falling over, but the whole shipment can still slide. A shifting cargo can create havoc when it crashes; distorting skids and knocking out fastenings. If the shipment is free to move, it may turn crosswise. The benefit of the long base is then lost and the machine may topple over. These precautions may appear to be fussy details, but studies of cases of damage in shipment show neglect of these small but important points.

There is a growing trend to provide special cars with a sturdy "egg crate" arrangement for shipping items like motors and generators. These cars are weather-proof to protect the apparatus during transit. This is in sharp contrast to just loading it into a gondola car. Although that is the easiest way, it may often prove to be the costliest.

Hidden Dangers

Even with the machine on skids having a good base, and with it blocked to prevent shifting, we are not yet through. Something not so obvious, even to the experienced shipper, is what can happen to heavy parts inside a machine when they shift during shipment. Take as an example the heavy generator armature enclosed by its frame. A roller bearing centralizes the armature and carries its weight. In some generators this bearing also takes the end thrust of the armature. A self-aligning spherical roller bearing or a ball bearing is commonly used. Generators with fixed armature position are usually mounted on the engine sub-base or on the locomotive platform. The armature is connected to the crankshaft through a flexible coupling to allow for

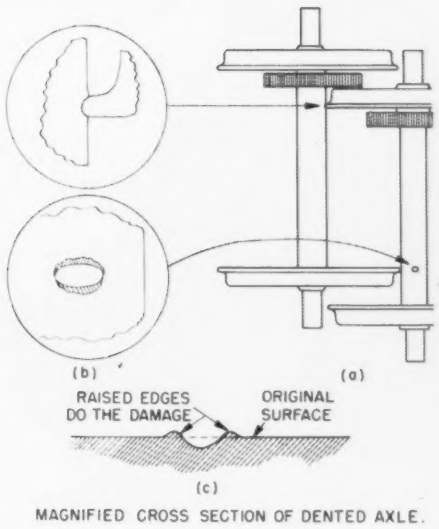


Fig. 5—Careless nesting of wheels and axles can cause damage to suspension journal surfaces.

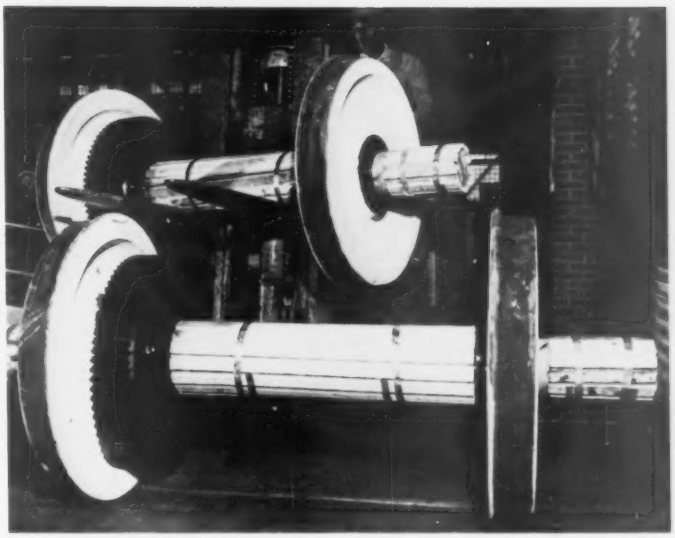


Fig. 6—These axles are protected by a layer of woodslats against damage in handling and storage.

differences in movement between the engine and generator. Other generators are mounted directly on the engine. In this case the armature is connected solidly with the crankshaft. The come and go between the engine and generator is provided by a generator bearing having end play. If a self-aligning spherical roller bearing or a ball bearing is used, it is usually locked to the generator shaft. The outer race is then left free to slide in the bearing housing. This is a metal-to-metal contact with very little sliding motion. Hence it is difficult to lubricate and becomes a source of wear. One solution in more recent designs uses a cylindrical roller bearing. Both the inner and outer races are fixed, the end play movement taking place between the revolving rollers and the inner race. Lubrication is better, and experience has proved this to be an excellent solution to the problem.

When this type of generator is removed from the engine, the armature is no longer restrained by the crankshaft. It is now free to shift endwise under impact. When this happens the inner bearing race drags lengthwise across the now stationary cylindrical rollers. The pressure exerted by the heavy armature on these fine line contacts with the rollers smears grooves across the polished surfaces. The bearing is ruined, as shown in Fig. 8. If the generator is headed for the shop, this damage will be found and the bearing changed out. But if it is going into service, nothing may be found until some alert running maintenance man hears the bearing clicking. If not detected in time, the bearing may fail completely, causing severe and extensive damage.

This hidden damage to roller bearings can be avoided by blocking the armature so it cannot shift within the

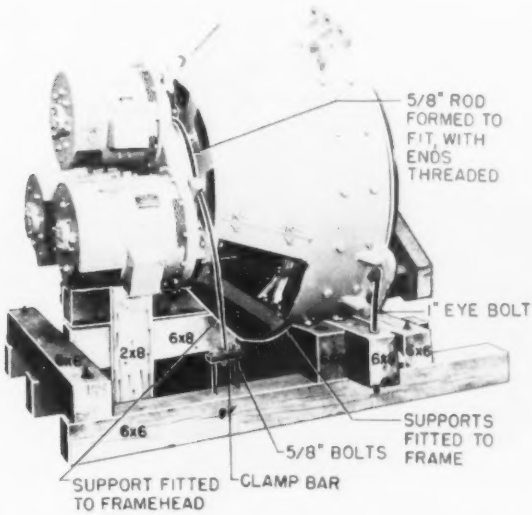


Fig. 7a—Front view of traction generator mounted on skids.

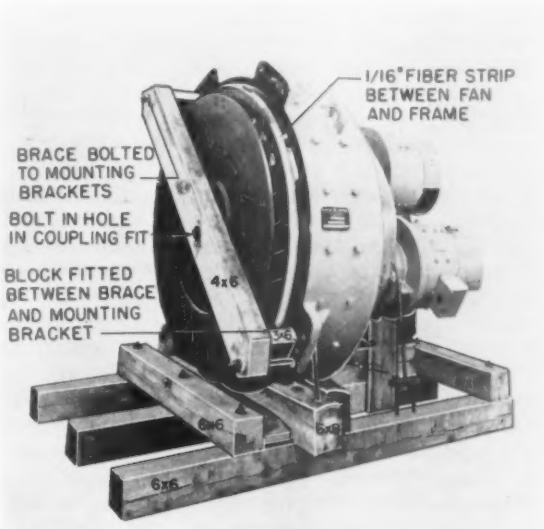


Fig. 7b—Rear view of traction generator mounted on skids.

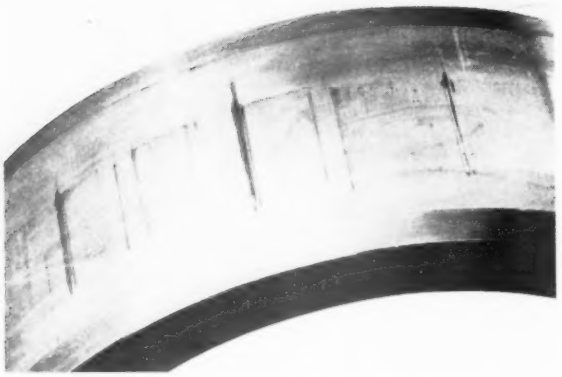


Fig. 8—Careless handling smeared this inner bearing race.

frame. This is best done with a beam bolted across the engine coupling face of the armature, Fig. 7b, and the end of the frame. With proper spacing this will hold the armature midway in its bearing position. Don't just force the armature ahead to the end of its travel. If you do there is danger of bending or damaging the flingers or bearing chamber seals. Study the builder's instructions and section drawings so you know what is happening. Remember that bearings damaged in shipment are easy to identify. The source of the trouble can easily be traced, especially if the machine comes in without the armature properly secured in the frame.

Impact is not the only cause of armatures shifting and marking their bearings. If a generator is tilted far enough when it is lifted, the armature will slide down hill. Sometimes a generator is purposely tilted to turn it from a horizontal to a vertical position for disassembly. If this is done the armature must be secured against sliding in the bearing. Fixtures for this purpose are available or can be made. (Refer to builder's instructions and tool lists.) These are bolted to the end of the shaft and the frame head to prevent sliding and overloading the bearing housing seals.

Equipment out of its working position in a locomotive is like an egg out of its nest. You don't have to move equipment 100 miles to get into trouble,—it can be damaged in moving it only 10 feet. Remember, more accidents happen at home than anywhere else.

Alco and EMD Units Run M-U

(*Continued from page 69*)

Not all Western Maryland locomotives were built with dynamic braking, and not all units have even yet been so equipped. However, all locomotives which may operate in road freight service are equipped with a field loop and with dynamic brake interlock in the D-24 control valve so that they will operate in a locomotive consist without complications, when the other units are in dynamic braking.

This multiple unit operation of two builders' locomotives has been further complicated by a mixture of models. The roads early EMD F-7 units are limited to a maximum of 600 amp in dynamic braking, and the later F-7 and GP-9 units to 700 amp. The Alco road switchers are not to exceed 650 amp and the Alco road freight units can operate at currents up to 800 amp. The Western Maryland has now equipped all of its locomotives with automatic dynamic brake limiting controls, instead of relying solely on the brake warning signals to prevent overloading of braking grids and power equipment. Result of all these changes has been an increase in locomotive utilization.

From the Diesel Maintainer's Note Book

A Piece of String

By Gordon Taylor

A FOUR-UNIT LOCOMOTIVE, consisting of two Alco A units and two Alco B units, was dispatched from a principal terminal. The locomotive had hardly cleared the train yard when there was a ground relay action on the trailing A unit.

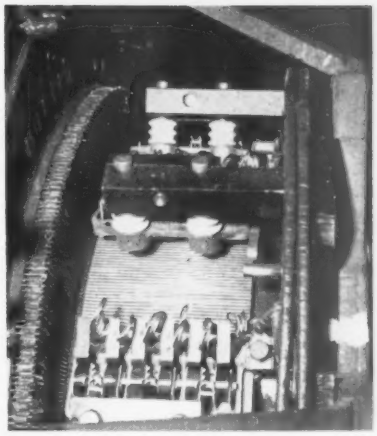
The relay was restored and a few miles farther a second ground relay action occurred, followed by a few miles further on a third ground relay action. At this point, 22 miles out of the terminal, the unit was isolated and the train reduced to a 3-unit rating.

The defective unit was returned dead in the train to its home terminal. An inspection revealed that the power circuit leading from the main generator was grounded by a piece of dirty string, which appeared to be a string from one of the mops used to mop out the floor of the engine room. Apparently, the wet, dirty mop string had landed on a bus bar connection located in the sump beneath floor level near the generator,—one end of the string on the bus bar, the other on the metal frame of the car body. When the generator voltage built up, the current followed the string to ground, with the result that the generator naturally dropped its load.

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

How Much Do You Know About Brushes

What Is the Function of Brushes in Commutation?



BASICALLY, COMMUTATION is the word describing the function performed by the brushes and the commutator of a motor or generator. In the case of a generator, this is the function of rectifying or commutating the induced currents in the armature coils. In a motor it is the function of conveying the current to the armature coils. In practical operation, these functions must be performed without damage to the commutator bars, with maximum life for the brushes, and under all operating conditions to which a given machine may be subjected. This may mean high voltage with low amperage, such as obtained at high speeds for a diesel locomotive, or it may mean low voltage with high amperage, such as obtained at starting speeds for a diesel locomotive. A third condition exists in the case of diesel traction motors wherein in dynamic braking each motor becomes a generator and the main generator idles at very low electrical output. A fourth condition exists for the diesel locomotive generator; idling for hours at zero electrical output. Regardless of how thoroughly the practical man has considered these conditions, the ability to operate a diesel unit free from commutator or brush trouble under all of them is what is really meant when it is said that commutation is excellent.

To understand the reason for the difference in the way various brush grades perform it is necessary, at this point, to insert a brief resume of how a traction motor performs. In order to obtain excellent commutation on a diesel traction motor, the brushes must serve as a sliding contact to the bar of the coil being commutated and must also carry the induced current, inherent in the armature coils, momentarily short-circuited by the brush. The short-circuit currents are at a minimum value when the brush holders are so located as to place a stud of brushes exactly at the electrical neutral between the main poles of the machine. The mechanical neutral position of the brushes and the electrical neutral position are not the same. This is because the magnetic flux of the field, called field form, is distorted by the flux originating from the armature coils as the armature rotates. Each main pole of the motor field possesses a magnetic field extending in a symmetrical mushroom-like pattern about the end of the pole. When the motor rotates under power, this pattern or field form is distorted to a varying extent as the armature current varies the armature flux. Simplified, the distortion is the result of the armature field acting at right angles to the main field and pushing off center.

As a help in trying to force the field form back into its symmetrical pattern, poles known as interpoles are located midway between the main field poles. These poles are wound so that, as the curent flowing through the motor increases their magnetic fields oppose the armature reaction, and serve to keep the main field flux where it belongs. However, there is a limit to the benefit which can be derived from the use of interpoles. This limit is reached when the current exceeds a level beyond which no further increase in the strength of the electrical fields of the interpoles can be obtained. This is called magnetic saturation. The influence of the interpoles is also affected when part of the main field is shunted.

By shunting, we simply mean that the magnetic strength of the main poles is reduced. When the main field strength is reduced under a condition of constant load and voltage, the armature current and speed will increase.

All the above considerations read rather easily but bringing them about in practice is not so simple. From the foregoing, it is apparent that it is imposible to build a practical traction motor which will have the brushes in the perfect theoretical neutral position under all operating conditions. Perfect interpole correction of the field form under all conditions is not practical. However, an excellent compromise can and has been worked out by the electrical and brush manufacturers. Using the best compromise neutral setting for all operating conditions puts the job of commutation squarely up to the brush grade.

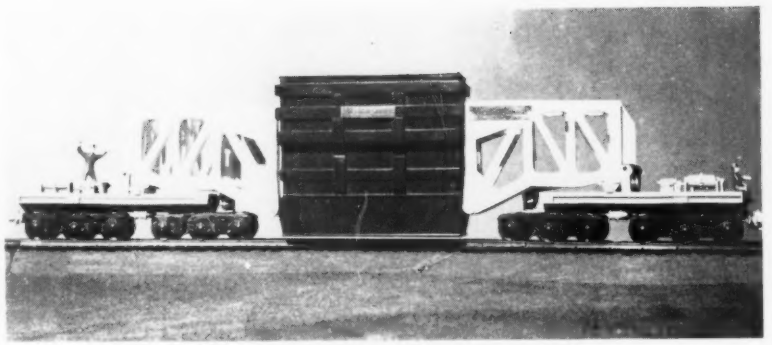
Whether or not a given brush grade can be expected to perform satisfactorily can be, and is indicated by measuring the commutating range or black band properties of that grade. The black band test measures the degree of electrical maladjustment which a given brush grade can tolerate. In performing the test under laboratory conditions, a motor balanced as perfectly as is possible with respect to electrical neutral, interpoles, and field form is used. Maladjustment is simulated by strengthening (boosting) or weakening (bucking) the interpole current until a certain degree of sparking occurs at the brushes under both types of maladjustment. The current level and voltage to the motor is maintained constant during the determination of the two points. The amperes of boost current required to produce the permissible level of sparking at the brushes represents the black band spread under that test condition. The same is true for

This is the second, of a series of questions and answers which are appearing each month.

the buck current. In practice buck and boost points are determined to cover the range of electrical conditions under which the motor can be operated. These data then represent an excellent picture of the commutating ability of the brush grade being tested. In other words, this test measures how much maladjustment the brush can handle. No test of unproven brushes should be attempted on railroad equipment, without first obtaining this information. A brush grade may have excellent commutating ability under high-amperage, low-voltage, slow freight operation, and fail miserably under the low-amperage, high-voltage and high-rubbing speed of fast passenger operation. Having passed the black band test, the final assay of the brush grade is derived from its ability to film properly on the commutator. It must have a critical rubbing speed which is above the maximum level of rubbing speed which will obtain in service, and it must have adequate life.

The ability of a brush grade to handle all conditions must be built into the brush by the brush manufacturer. This is accomplished by maintaining the proper balance of physical and electrical properties, some of which were described in the March 1957 issue.

By K. R. Matz
National Carbon Company



Three-Part Car Will Carry Huge Transformers

A RAILROAD CAR in three parts, one part being the actual load the car is carrying, has been designed by Westinghouse Electric Corporation. The car, for transporting huge power transformers now required by utilities, is being built by the Greenville Steel Car Company and will be placed in operation early this summer.

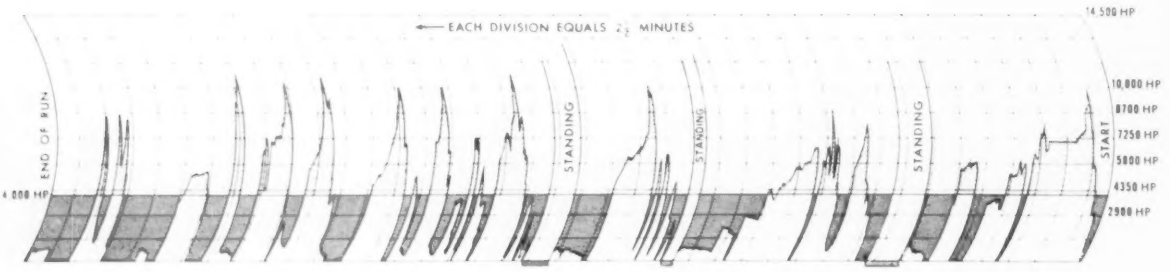
The car, with a load capacity of 500,000 lb, will transport a transformer 28 ft long and 12 ft wide. Each of its two identical sections are about 30 ft long and consist basically of an underframe with trucks on which is mounted a steel truss (see illustration). The transformer is suspended between the two trusses, forming the complete car. Primary benefit of the car is that the transformer can be lowered to and carried within about six inches of the rails.

The car, which has an overall length of about 90 ft when carrying a 28-ft transformer between car connections, can negotiate the same curves as a standard box car. Two 100-ton hydraulic jacks at each load center facilitate loading and unloading. Use of the car is limited to certain types of transformers. For the return trip of the unloaded car, the two end halves are hooked together and returned as a conventional car.

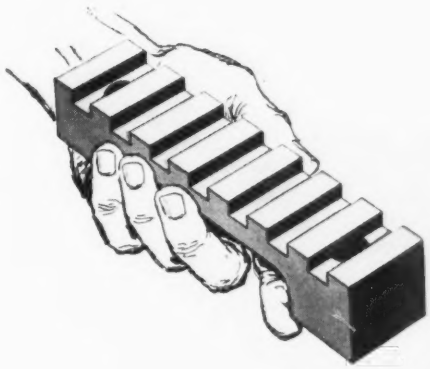
What Thermal Capacity Means . . . . Getting the Most Out of Motors

THIS IS THE POWER input curve for a 4,000-hp electric locomotive, hauling an 18-car passenger train on a 100-minute run in regular service. The six motors have a continuous rating of 4,000 hp, but there is a relatively unlimited amount of power available from the overhead wire. So the motors may receive power considerably in excess of 4,000 for short periods, provided their temperature does not exceed prescribed values.

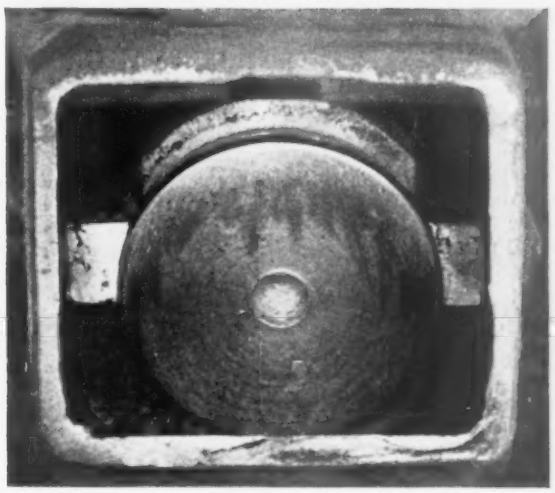
The lightly shaded areas above the 4,000-hp line show the product of current and time which work to raise motor temperatures above safe limits. On the other hand, the heavily shaded areas below the 4000-hp line indicates periods when the motor blowers are removing heat and reducing motor temperatures. So it is possible to obtain high values of power, at times exceeding 10,000 hp, without exceeding safe motor temperatures.



Improve the efficiency of any journal lubricator with Magnus R-S JOURNAL STOPS



Longer bearing life and lower maintenance costs for trucks and journal boxes also yield big return on initial R-S Journal Stop investment



Here's proof of Journal Stops' unique ability to hold packing in place even under extreme service conditions. This unretouched photograph shows the interior of a Journal-Stop-equipped box after undergoing an 11½ mph flat-switching impact test. Waste is still firmly seated under the journal.

WITH conventional waste packing and Magnus R-S Journal Stops, you can run freight cars for *three years* between periodic servicing. That's been established by test experience to date.

Bolted to both sides of the journal box, the bronze bearing-metal Journal Stops form a permanent, built-in waste "container" that holds the mass of packing right where it belongs, even under severe braking and impact forces. And, unlike any other waste container or retainer, by keeping the bearing on the journal, you prevent short strands from being trapped beneath the bearing crown. By restricting fore-and-aft movement of the journal within the box, they prevent squashed-down waste packs, maintain constant journal-to-packing pressures, assure a uniform feed of oil to the bearing and *eliminate danger of waste grabs.*

But that's not all. You also get longer bearing life and freedom from spread linings. You reduce the requirements for an effective box rear seal and increase the efficiency and service life of present dust guards and seals. That's vital to the successful operation of most waste substitutes.

Pad and mechanical lubricators benefit too. By keeping the journal in its proper position, you keep the box from rising during impacts and braking—don't crush the lubricator or seal. Axle dust guard seats can't be scored either.

WHAT ABOUT COST? One private car line estimates it has recovered more than 90% of the total cost of Stops and installation in just the first 20 months of operation. Other roads report comparable savings. R-S Journal Stops not only pay for themselves in reduced maintenance costs. They get cars to destination with trouble-free journal boxes. Write for complete information. Magnus Metal Corporation, 111 Broadway, New York 6 or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

MAGNUS METAL CORPORATION

Subsidiary of **NATIONAL LEAD COMPANY**

QUESTIONS and ANSWERS

Interchange Rules

This is the twentieth installment of a series of questions and answers on the Association of American Railroads Code of Rules Governing the Condition of, and Repairs to, Freight and Passenger Cars for the Interchange of Traffic which may help car men clarify their understanding of the philosophy, intent and requirements of the Interchange Rules. The answers given to the questions are not to be considered interpretations of the rules of Interchange, which can only be rendered by the Arbitration Committee acting officially. The comments, however, come from a background of intimate association with the application of the rules. Obviously, comments or opinions as of today, may be inapplicable after a revision of the rules or further interpretations by the Arbitration Committee.

208-Q—Where car equipped with auto loading devices is loaded with a contaminating commodity as outlined in Section (12) (b) of Rule 32, is car owner entitled to protection for the resultant contaminating damage?

A—In cases where cars are equipped with auto loading devices, the general condition of same must be such that they are fit for grain loading or better in order to be entitled to protection under Section (12) (b) of Interchange Rule 32 where loaded with contaminating commodity.

209-Q—What portion of Rule 4 governs the matter of responsibility for holes cut in end slope sheets of hopper cars with torch for the purpose of draining water from car when loaded with sand?

A—The sloped portion of single sheet of hopper car comprising both end and slope sheet shall be considered in the same category as a floor sheet and be governed by Paragraph (e) (2) of Interchange Rule 4 insofar as the issuance of defect card is concerned.

210-Q—Is the term "proper data" as used in Interpretation No. 4 of Rule 2 intended to include information with respect to the dimensions of loads exceeding the published clearances of roads over which such shipments are routed?

A—No.

211-Q—When mechanically refrigerated cars are light-weighed, should the light-weight stenciling be based on empty or loaded fuel tanks?

A—The light-weight stenciling of mechanically refrigerated cars must be based on cars having empty fuel tanks.

212-Q—Is it possible for the car owner to obtain protection under the Interchange Rules where car with questionable light-weight applied by a foreign road arrives home and such car is re-light-weighed by owner and found to actually have a light-weight considerably at variance with that shown on the car?

A—It is the intent of Interchange Rules 30 and 31 that light-weighing of cars under the provisions of these rules be done in such manner that the actual light-weight of car is determined and properly stenciled on the car. If this is not done, the car owner should secure joint evidence per Rule 12, the same as for any other wrong repairs.

213-Q—Is labor charge permissible where center plate is applied and secured with bolts in place of rivets standard to car?

A—Labor charge for jacking car is not permissible in connection with renewal of center plate secured by bolts when jacking was performed only for the purpose of renewing center plate. In cases where jacking is performed at same end of car in connection with other owner's defects and center plate is renewed and secured by bolts, full jacking charge is permissible.

214-Q—In a case where two cars are jammed together and one or more wheels of one of the cars involved are suspended above the rails and then drop back on the rails when cars are subsequently pulled apart, does this constitute a derailment under the provisions of the Interchange Rules?

A—No.

215-Q—In establishing allowances under Items 110-A and 109 of Rule No. 101, what consideration was given to the bolts which secure the items involved to the car?

A—Charges as shown in Item 110-A include a material charge for lumber and bolts as well as a labor charge for two bolts. No additional material charge is permitted for bolts passing through bracket, board and car. Item 109 of Rule 101 does not provide a material charge for bolts applied, but merely a charge for lumber plus labor charge for two bolts.

216-Q—Is additional labor charge permissible for R. & R. of bolts in brake beam sliding chair castings in connection with brake beam applied, it being understood that the regular labor charge is made for application of brake beam?

A—No additional labor charge is permissible for short bolts in sliding chair castings in connection with the R. & R. or R. of brake beam.

217-Q—Are the Dresser pipe fittings as shown in Items 101-C to 101-E, inclusive, proper substitutes for the Wabcoseal fittings as covered by Items 101 to 101-B of Rule 101.

A—Yes.

24-RL Brake Equipment

This is a new series of Questions and Answers pertaining to recent developments in the 24RL air brake equipment for road locomotives. The first questions will deal with the Pressure Maintaining feature. Authorized persons may obtain information on this subject in Instruction Pamphlets 2606-I, and 2601-I Supplement 1 by communicating with their nearest Westinghouse Air Brake representative.

R70-Q—What is accomplished by this upward movement of the piston assembly?

A—The plunger contacts the equalizing discharge (exhaust) valve *(742)* holding it unseated.

R71-Q—With the valve unseated, what flow of air takes place?

A—Brake pipe air flows past the open valve to passage *15*.

R72-Q—Explain the flow of air further.

A—Passing through a choke, brake pipe air flows into passage *16* which is connected to the exhaust passage by a port in the rotary valve seat.

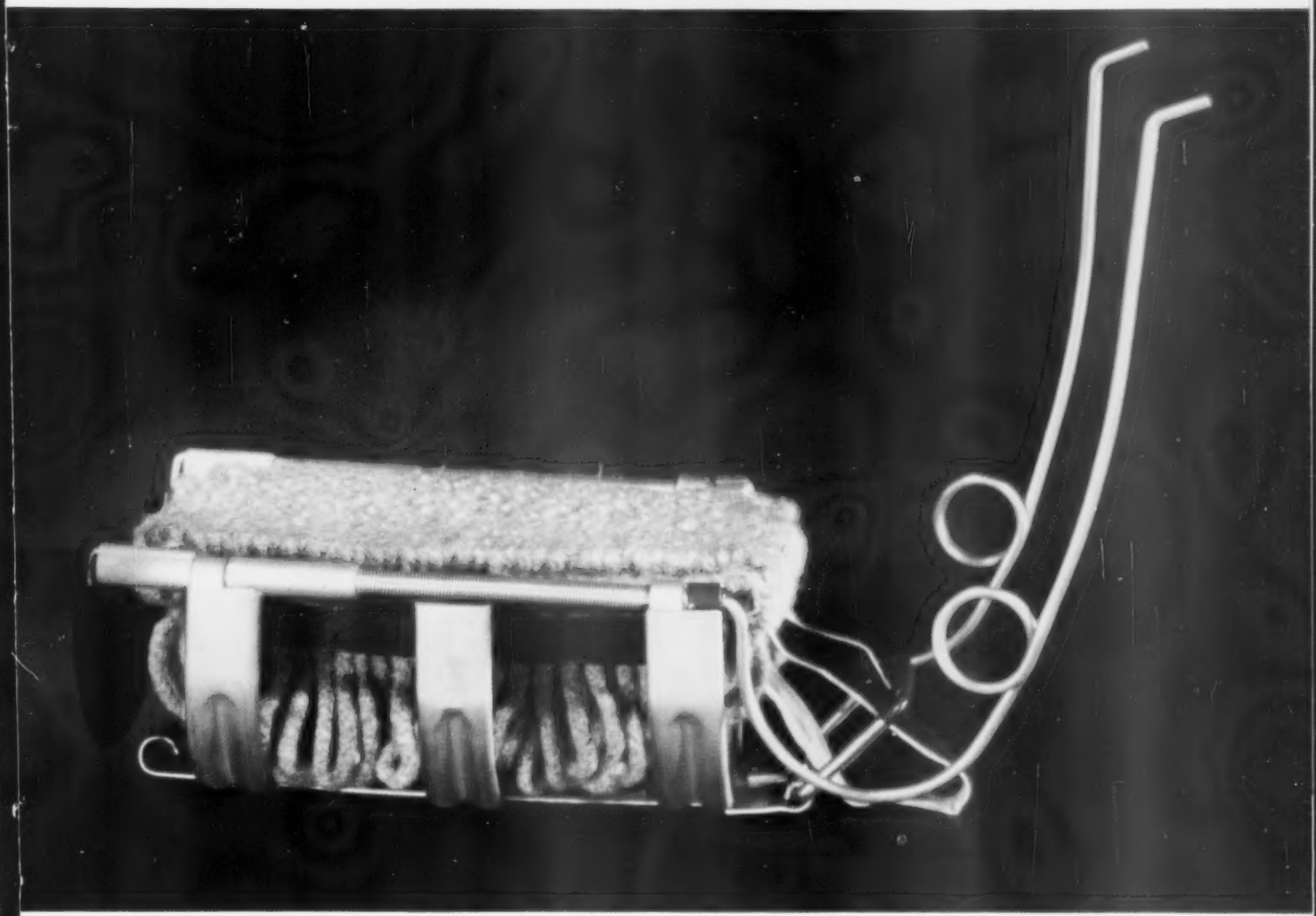
R73-Q—What is the purpose of the choke between passages 15 and 16?

A—To restrict the air flow so that brake pipe as well as equalizing reservoir and chamber *D* pressure is reduced at a controlled rate.

(Continued on page 80)

THE LUBRICATING SYSTEM THAT IS CHANGING THE THINKING OF RAILROAD MEN!

L I



PATENTS PENDING

The ROLIN transforms any journal box into a modern, non-mechanical lubricating system in minutes.

The flexible cradle frame fits the curvature of any journal box; holds the pad snugly against the journal.

Spring action holds the cradle in positive position, yet allows the pad to follow journal movements and prevents shock being transferred to the cradle. This flexible design also permits jacking of the box for easy removal of bearings without touching the lubricator.

The unique cord in the pad consists of a tough thread woven around an absorbent inner lining. These endless wicks suspended below the cradle provide a rapid and continuous "pipeline" flow of oil; with a high absorption and retention capacity furnishing a tremendous additional oil reserve.

This is the ROLIN . . . designed and engineered to guarantee you freedom from waste grabs, linting, glazing, freezing, oil starvation and other causes of lubrication failures.

The ROLIN is now in general interchange service on 61 American railroads. For factual data and the truly interesting story of the development of this remarkable device, write:

THE rolin CORPORATION

80 EAST JACKSON BOULEVARD • CHICAGO 4, ILLINOIS • WEbster 9-3587

QUESTIONS AND ANSWERS

(*Continued from page 78*)

R74-Q—What must be done when the equalizing reservoir pressure, as shown on the gauge, is reduced the desired amount?
A—The brake valve handle is moved to *LAP* position.

R75-Q—Does all air flow cease at this time?
A—No. Further flow of equalizing reservoir pressure stops because the rotary valve connects passage *16* to the exhaust in *LAP* position. Air continues to discharge from the brake pipe until the pressure under the equalizing diaphragm has fallen to a point slightly lower than chamber *D* pressure.

R76-Q—What then takes place?
A—The diaphragm and piston assembly will be moved down to normal position and allow the equalizing discharge valve to close, cutting off further exhaust of brake pipe pressure.

R77-Q—Is the time involved in the closure of the valve the same in all cases?
A—No. The piston movement is influenced by the rate at which the brake pipe is reduced, therefore the valve will close more slowly with a long train than with a short one.

R78-Q—What is determined by the amount of reduction in equalizing reservoir?
A—The amount of brake pipe reduction regardless of the train length.

R80-Q—Why is it necessary to stop this discharge gradually?
A—To prevent the brake pipe pressure at the head end of train being built by the air flowing from the rear, which action might cause some of the head brakes to kick off.

R81-Q—For a given reduction, does the time required for the brake valve handle to be held in service position vary according to various train lengths?
A—No. The time is the same regardless of train length.

R82-Q—With the brake valve handle now in LAP position and the maintaining cut-off valve position in IN position, how will the equalizing portion operate?
A—To maintain a constant brake pipe gradient for any permissible amount of brake pipe leakage.

R83-Q—Explain the maintaining operation when brake pipe leakage exists.
A—When brake pipe pressure beneath the equalizing diaphragm becomes less than that in chamber *D*, due to leakage, the diaphragm assembly will move down, the stem contacting the maintaining valve *(722)*, holding it open.

R84-Q—What action then takes place?
A—Feed valve air from passage *14a* (from maintaining cut-off valve) will flow through the strainer, maintaining supply choke, and open maintaining valve to brake pipe passage *2b*.

R85-Q—How long will this flow of air continue into the brake pipe?
A—Until brake pipe pressure beneath the equalizing diaphragm has been built up sufficiently to cause the diaphragm piston assembly to move upward.

R86-Q—What action results from this upward movement?
A—The choke size is adequate to maintain against valve, allowing it to close.

R87-Q—What limits the rate of feed valve pressure flow available for maintenance of brake pipe leakage?
A—The maintaining supply choke.

R88-Q—Approximately, what is the capacity of this choke?
A—The choke size is adequate to maintain against 5 psi per minute leakage after a 15 psi reduction on a 150 car train.

6-SL Brake Equipment

This series of Questions and Answers pertains to the 6-SL air brake equipment for switching locomotives. The references to the pamphlet, page and part numbers in the text indicates where the original material may be found in the manufacturer's technical publications and instruction pamphlets. Authorized persons may obtain a copy of Instruction Pamphlet Number 5046-15 which deals with this equipment by applying to the nearest district office of the Westinghouse Air Brake Company.

W208-Q—How is the equalizing reservoir volume connected in the Emergency position?
A—Cavity *y* also connects *C* and *H* to the exhaust port, allowing air in chamber *D* and in the equalizing reservoir to escape to the atmosphere.

W209-Q—How is the rapid reduction of brake pipe pressure reflected at the distributing valve?
A—This reduction, as such, takes place so much more rapidly than during a service application that the air pressure in the pressure chamber of the distributing valve moves the equalizing piston *26* to its extreme position at the right, sealing against the gasket and compressing the equalizing piston graduating spring.

W210-Q—What ports are connected when the piston moves to the extreme right?
A—Port *h* in the slide valve seat is uncovered, making a direct opening from the pressure chamber to the application cylinder only.

W211-Q—What results from above action?
A—The pressure chamber and application cylinder volumes rapidly become equalized.

W212-Q—What further action takes place to insure that the equalizing piston is being held in emergency position?
A—Main reservoir air is permitted to flow through a restricted opening. It proceeds through port *a* and cavity *j* (in the rotary valve of the automatic brake valve) and port *2* (in seat) into application pipe and application cylinder.

W213-Q—What is the equalization point between the pressure chamber and the application cylinder?
A—At 70 lb (low pressure service), they equalize at about 65 lb.

W214-Q—What other connection has been made to the application cylinder at this time?
A—The application cylinder is connected to the safety valve through port *h2* (in the seat), cavity *q* and port *r* (in the equalizing slide valve) and port *l* (in he seat).

W215-Q—How are the port sizes proportioned?
A—Cavity *q* and port *r* are connected by a small port. Its size is proportioned to the size of the maintaining port in the automatic brake valve. As a result, air flowing from the main reservoir to the application cylinder escapes through the safety valve at a rate which limits brake cylinder pressure.

W216-Q—Will the brake cylinder pressure equal that of the main reservoir?
A—No. It will be considerably higher than that obtained from a full service application.

W217-Q—How does the application portion respond to the emergency action described above?
A—The application piston is moved promptly to the right, opening the application valve fully, producing a fast build-up of brake cylinder pressure.

This is the sixteenth in a series of advertisements about the people of Standard.

Specialists in saving money for the roads...

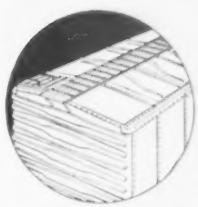
This is Standard's Wheel Truing team . . . men who specialize in helping you save *your* money.

That's team captain Mel McCracken standing with Don Pope and Jack Wilson seated, left to right.

This is a team you should know. They service quite a product . . . Standard's Wheel Truing Machine which restores the contour to multiple wear steel wheels . . . in mounted pairs or without removal from locomotives, passenger cars or spare trucks. Conditioning is done on the track in the running repair shop. There are no costly labor and equipment tie-ups and routine maintenance may be continued while the wheels are being turned.

When one of Standard's Wheel Truing team calls on you, you can be sure, as with all Standard representatives, that you'll receive the products and service that puts cars on the road paying their way.

Improved Dreadnaught Ends



Diagonal Panel Roofs

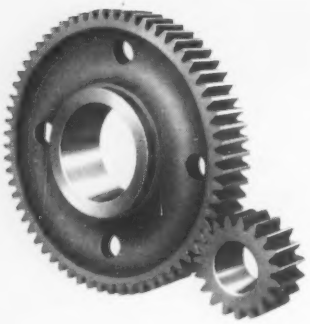
9 out of 10 house cars now in operation on America's railroads are equipped with Standard Ends and Roofs.

GEARED TO PROGRESS
RI
MEMBER

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY

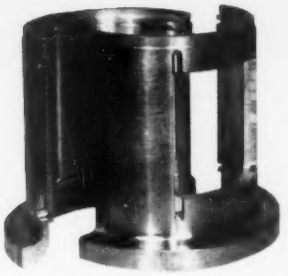
General Office: 4527 Columbia Ave., Hammond, Ind. • New York • Chicago • St. Paul • San Francisco

Standard Railway Equipment Manufacturing Company, (Canada) Ltd. Sun Life Building, Montreal



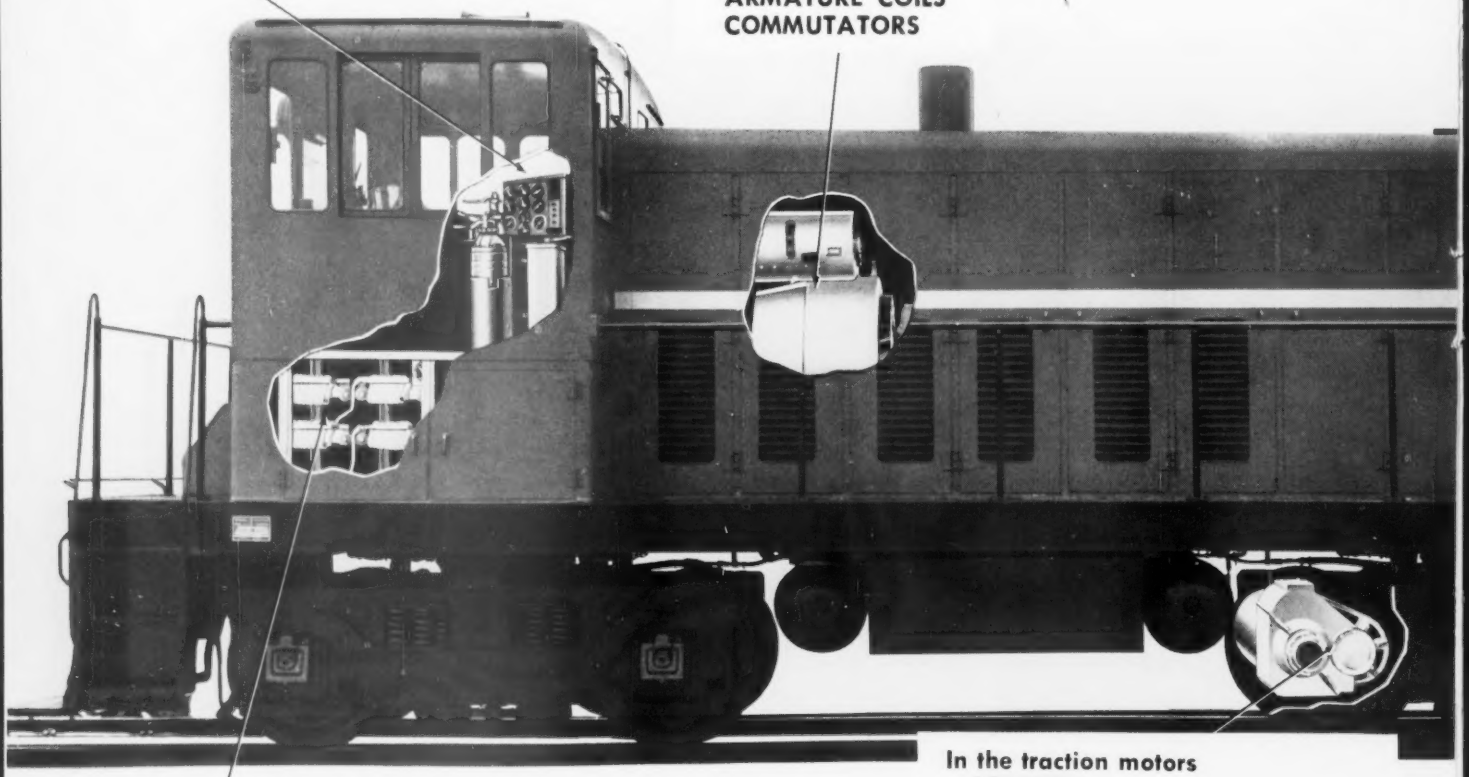
1 GEARING is designed and quality-control manufactured to carry heavy starting loads and running shock loads encountered in today's heavy railroad service.

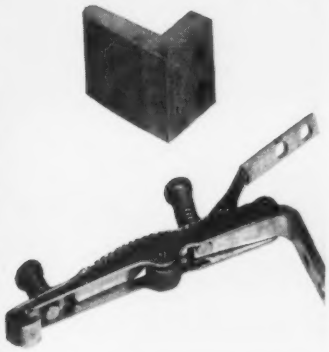
2 ARMATURE COILS are available as part of complete rewind kits. Every coil is dimensionally accurate, quality insulated for longer life.



3 MOTOR SUSPENSION BEARINGS give longer service life, have built-in oil-return feature for savings up to $85 of operating costs per locomotive unit, each year.

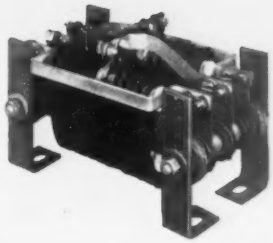
You Put Back the Top Performance When You Use General Electric's





4 CONTACT PARTS break circuits quickly with minimum metal transfer, giving long service life from these parts.

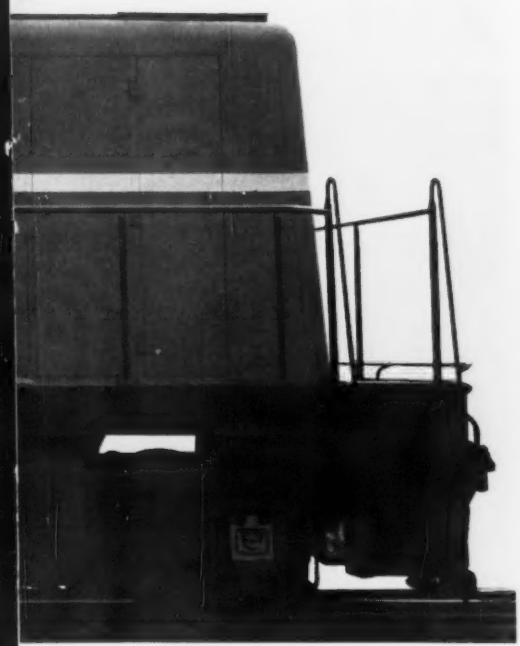
5 RECOMMENDED CARBON BRUSHES, selected for proper degree of hardness and grain structure, minimize wear and tear on commutator surfaces.



6 RESISTORS have floating steel backbones that expand, contract freely with high temperature changes, therefore are not subject to harmful bucking forces.

7 COMMUTATORS, seasoned by high speed, high temperature process, wear longer and retain smoothness.

You Originally Bought 7 Key Replacement Parts



Seven key parts are vital to the steady, dependable performance of your locomotive electrical equipment. That's why when you replace these key electric parts in your General Electric equipped locomotives, you'll want only G-E parts to help you keep all the power that you originally bought.

General Electric's 7 key replacement parts are precision-built to original parts specifications. Each one is manufactured to include the most recent design and engineering advancements. When you use these parts, you'll be helping the electrical components in your locomotives to meet the most modern and efficient standards of operation.

This means, of course, that you'll reduce maintenance costs too. You'll get many locomotive work-miles between parts replacements, and you'll save time by ordering all of your parts from one established supplier who will always have the parts that you need. By specifying General Electric replacement parts, you'll get long parts life, improved locomotive performance, and top value for your replacement dollar.

For all of your G-E equipped locomotive parts needs, contact your nearest General Electric Parts Center or your locomotive builder. For additional information on why G-E parts and parts services are best for you, write for our new brochure, Section 128-40, General Electric Locomotive and Car Equipment Department, Erie, Pa.

Progress Is Our Most Important Product

GENERAL ELECTRIC

EQUIPMENT . . . NEW IDEAS — NEW USES

(Continued from page 10)

needed. These are changed as the lapping operation is switched from coarse to fine and vice versa.

Lapmaster lapping machines are capable of generating surface flatness to less than one light band, and finishes to 2 RMS on parts such as diesel engine cylinder heads. *Crane Packing Co., Dept. RLC, Morton Grove, Ill.*

Degreaser

Armoreze, a degreaser for car journals, machinery, diesel gears and parts, has a chemical formula similar to that used in fire extinguishers. It is packaged in a push-button spray type container for convenient use.

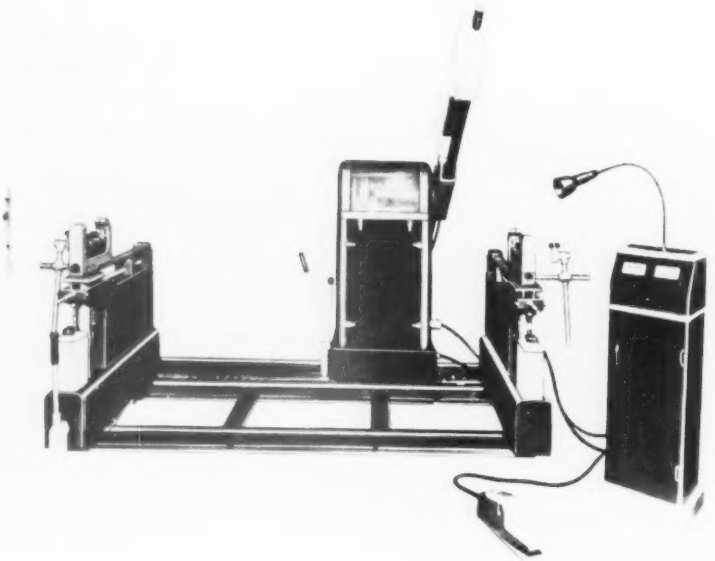
This product is especially useful at outside points on railroads, where steam cleaning is not available, for removing protective grease coating from car journals. According to the manufacturer, after the contents have been sprayed on, and allowed to set for 2 or 3 min, the coating can be easily wiped off. One pint can, it is said, will clean approximately 10 pair of wheels. *Plastic Armor Company, Dept. RLC, P. O. Box 761, Sherman Oaks, Cal.*

Plastic Coating

Insulcote is an emulsion type plastic coating, light tan in color, used for insulating galvanized metal box car ceilings. According to the manufacturer, it prevents condensation of moisture vapors during cold weather and is impervious to mineral solvents and fumes from treated lumber. Preliminary acid treatment of galvanized surfaces is not necessary before application.

This material can be applied with conventional heavy duty spray equipment, with a recommended minimum thickness of $^{3}/_{16}$ in., and at a temperature not lower than 50 deg.

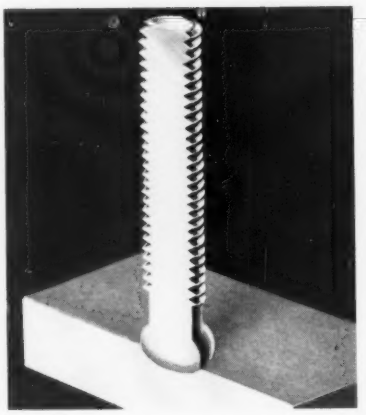
Insulcote is available in 5-gal pails and 55-gal drums. *Frost Paint & Oil Corp., Dept. RLC, 1209 Northeast Tyler, Minneapolis 13.*



Electronic Balancers

The Stewart-Warner electronic industrial balancer illustrated (Model 708) provides a weight range of 1 lb to 5,000 lb and a diametral range from 1 in. to 68 in. and a length range of 7 in. to 83 in. between bearing surfaces. Extra length is readily obtainable. It has sensitivity of .04 in.-oz. Another, (Model 704), has a weight range of from 8 oz. to 1,000 lb, a dimetral range of from ½ in. to 44 in. and a length range from 4½ in. to 55 in. between bearing surfaces. Sensitivity of .01 in.-oz.

Distribution of the Stewart-Warner line of electronic industrial balancing equipment, formerly marketed by Merrill Engineering Laboratories, Denver, Colo., is now being handled by the company through a special department headed by Ralph Buscarrello. *Stewart-Warner Corporation, Dept. RLC, 1826 Diversey Parkway, Chicago 14.*



Welding Studs

The KSM welding stud has a solid flux centered in the welding end of the stud. The bond with the surface to which the stud is fastened utilizes the stud's entire cross-sectional area to form a complete bond instead of merely joining the sides of the stud to the base surface. This weld is said to be stronger than the stud, and maximum strength and resistance to shear and torque are achieved.

Portable and production arc welding units for the application of these studs are available. The portable gun holds the stud away from the surface while creating the welding arc. The stud is held in this position until the stud ends and the plate below become molten. A spring in the gun then forces the stud into the parent work plate where it fuses. Standard welding generator and rectifiers can supply the necessary d-c current.

In addition to the externally threaded welding studs, unthreaded pins and internally-threaded welding pads are available. *KSM Products, Inc., Dept. RLC, Merchantville 8, N. J.*

Welding Electrode

A manual arc, general purpose, welding electrode, AWS E6013, is of heavily coated mild steel, for a-c or d-c operation in all positions. The moderate arc force gives adequate penetration, according to company engineers, the steady spray type transfer controlling the deposit.

Molten deposit is said to spread easily, producing welds with uniformly feathered edges and good shape. Its suitability to welding down in vertical fillets is a featured item. The combination of toughness with ductility found in the metal deposit is offered as an additional asset.

Tests made to AWS specifications showed these physical properties: $^{3}/_{16}$-in. diameter electrode—76,400 tensile psi, 65,100 to 67,900 yield psi, 27 per cent

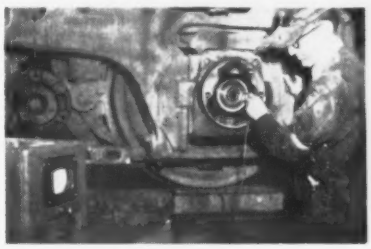
(Continued on page 86)

HELPING TO KEEP YOUR ROLLING STOCK SAFE

You Can Inspect Diesel Axles
WHENEVER THE ENGINE IS STOPPED

Today the regular and *frequent* testing of diesel axles is more important than ever before. Higher speeds, heavier loads and more of them, place a great burden upon motive power. That is why complete maintenance programs emphasize *frequent* inspection of vital components to assure their soundness and maintain a high availability level. The Sperry Ultrasonic Reflectoscope can be an invaluable asset to such a program.

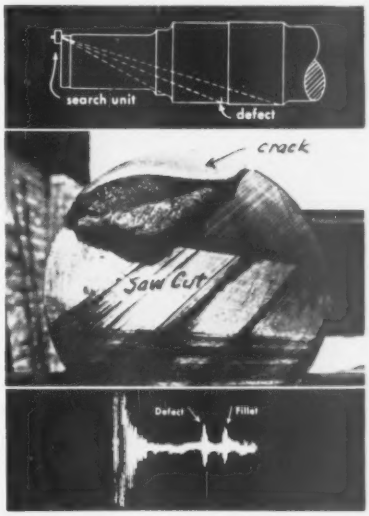
Fast, simple and accurate, the Reflectoscope tests diesel axles, *in place under the engine*—whenever and wherever the engine is stopped. For regular inspection this simple and searching method easily fits into periodic maintenance schedules—to provide axle inspection while wheel-truing, for example. By detecting and



locating flaws before failure occurs, Reflectoscope inspection helps prevent costly breakdowns, assures maximum equipment utilization and offers immediate maintenance economies.

HOW REFLECTOSCOPE "FINDS THE TRUTH"

The Reflectoscope projects a *narrow beam* of ultrasonic sound waves through the axle. Any defect encountered by the sound beam reflects back to the Reflectoscope and is pictured on the cathode ray tube. The Reflectoscope not only finds the defect, it shows where it is.



For diesel axle testing, special search units are used. These units project beams at an angle instead of in a straight line. Angle beam search permits testing of fillets and similar critical areas which cannot be reached by a straight beam search unit.

Discovering flaws in the pre-failure stage is "low-premium" insurance against equipment failure and the losses this could entail. Reflectoscope testing is one of the surest, most economical ways to "keep 'em rolling." Your Sperry Sales Engineer will be glad to give you the complete Reflectoscope story for complete maintenance programs. Or, detailed literature is yours for the asking.

Sperry

SPERRY RAIL SERVICE

Division of Sperry Products, Inc. · Danbury, Connecticut

Leader in Nondestructive Testing

Sperry

New York, N.Y., 110 East 42nd St. · Chicago, Ill., 80 East Jackson Blvd. · St. Louis, Mo., 818 Olive St.

NEW! A 35 Ton Hydraulic Journal Jack

First in the Industry!

You asked for it and here it is—a brand new jack designed and built especially for servicing heavier freight cars. It can raise 35 tons 6 inches—is only 9.7 high—weighs but 55 pounds. With the 35H9.7, the job of inspecting and renewing journal brasses can now be done without the danger of overloading a lower capacity hydraulic journal jack—and the work can be done faster with less effort! If you have the problem of lifting heavy cars, we suggest you get complete details on this new 35 ton hydraulic journal jack immediately. Write the world's oldest and largest manufacturer of lifting jacks for bulletin AD29-G.

DUFF-NORTON

Duff-Norton Jacks

DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

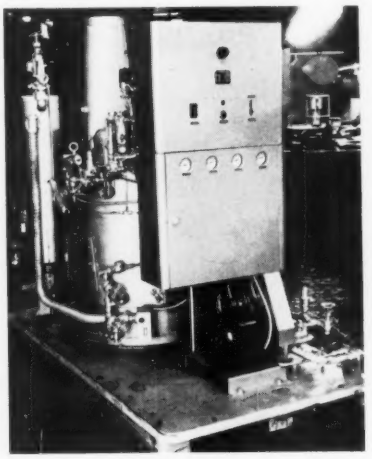
COFFING HOIST DIVISION: Danville, Illinois

Rachet Jacks, Screw Jacks, Hydraulic Jacks, Special Worm Gear Jacks, Rachet Hoists, Electric Hoists, Load Binders, Spur Gear Hoists

EQUIPMENT

(Continued from page 84)

elongation. ¼-in. diameter electrode—72,400 to 73,500 tensile psi, 62,900 to 62,400 yield psi, 28.5 per cent elongation. Charpy v-notch impact value of 33 ft-lb was obtained at 0 deg F. *Welding Dept., General Electric, Dept. RLC, Schenectady 5, N. Y.*



1,750-lb. Steam Generator

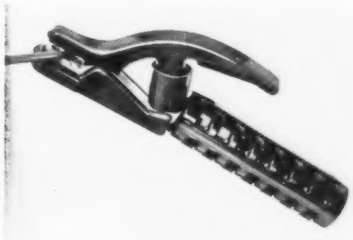
From 60 deg feed water, the Vapor Modulatic steam generator Model 4615 produces 400 to 1,750 lb of steam per hour at 75 to 300 psi. This generator has 99 sq ft of heating surface and is rated at 60 bhp.

Automatic controls cause the steam generator to cycle on and off and change the volume of steam produced to meet a changing steam demand. The servo-water-bypass-control meters the fuel, feed water and combustion air. Working steam pressure is changed from 75 to 300 psi by turning one control.

The 4615 steam generator is 84-in. long, 48-in. wide and 70-in. high. The 337 ft steel coil is designed so that hot gasses, wipe over and around the loops to transfer heat to the water being pumped through the coils under pressure. A steam separator removes excess moisture. Three burners are available—one for No. 2 fuel oil, one for natural gas, and a combination burner for oil or gas. Fuel may be changed by flipping one switch and without changing any parts.

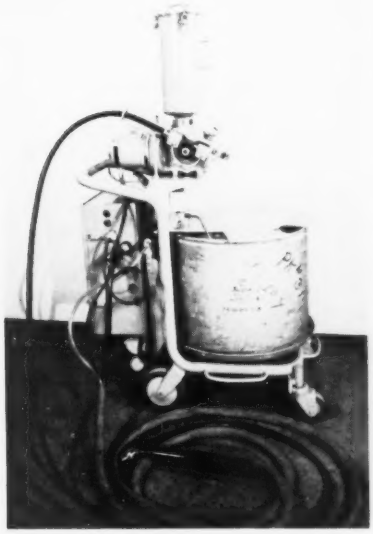
The protective controls are steam temperature limit, low water cut out, electric eye, safety valve, motor overload cut out, atomizing steam or air combustion switch cutout and excessive water pressure relief valve. The 4615 Modulatic steam generator is a complete package which includes a 3-hp electric motor, blower, feed water pump, steam separator, fuel pump and panel mounted

controls all assembled on a steel base. *Dept. PR-57, Vapor Heating Corp., Dept. RLC, 80 E. Jackson Blvd., Chicago 4.*



Electrode Holder

A tong-grip electrode holder, which will deliver 300 amp on a heavy duty cycle when connected to a 2/0 cable, has been made available. It weighs 17 oz and features all glass insulators. It has a spring cup and a slip-on insulator with no screws or rivets. No current is carried in the hinge pin or upper tong. A wedge cable connector makes a tight and permanent connection. The holder has only nine parts and can be assembled or disassembled in a few seconds. *Martin Wells, Inc., Dept. RLC, 5886 Compton ave., Los Angeles 1, Calif.*



Continuous Welding With Magnetic Flux

Unionarc welding is a manual arc welding process embodying a continuously-fed wire electrode which is magnetically coated with flux and shielded in a gas atmosphere. At the present time, this process is being used to produce high-quality welds in steel. The manufacturer states that it can be used in all positions at greater speeds and lower costs than covered electrodes.

A bare wire electrode of common steel

NEW *Utility* PRESS BY

FJELLMAN AMERICAN

for Forcing, Bending, Forming, Drawing up to

200 TONS

ONLY 8'7" D. x 4'5" W. x 11'3" H.

Here's a unique, compact press — ideal for custom forming where pressures up to 200 tons are required — with infinitely variable pressure-control. Its goose-neck design, 300° loading arc, high throat and long, exacting stroke make the Fjellman American utility press an extremely versatile machine for your custom production and repair department assignments.

FJELLMAN AMERICAN, INC.

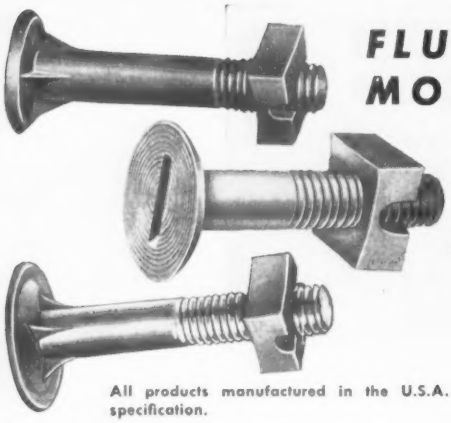
105 Republic Avenue • Joliet, Illinois

▶LOADS THROUGH A 300° OPENING. PERMITS OPERATOR FULL VIEW OF WORK AND GAUGES EVERY MOMENT.

▶PRESSURE REGULATES IN AN INSTANT WITH FINGERTIP ADJUSTMENT. PISTON LOCKS ANYWHERE WITHIN 27½" STROKE.

▶TWO-STAGE PUMP, OIL RESERVOIR AND HYDRAULIC SYSTEM ARE HOUSED WITHIN MASSIVE FRAME. RUGGED, CLEAN, EFFICIENT OPERATION.

Write for complete data and specifications



FLUSH FIT MOISTURE TIGHT..

...WITHOUT COUNTERSINKING

Lewis sealtite car bolts

Each Lewis Sealtite car bolt has special "wood engineering" beveled head for flush, moisture tight, fit . . . without countersinking. Standard and large-head car bolts have patented fins that grip wood, prevent turning . . . slotted head bolt can be set with screwdriver. Available in Hot-Dip galvanized finish for "Long Life Economy," in black for low first cost. Call, write or wire for sample prices.

All products manufactured in the U.S.A. to A.S.T.M. specification.

Lewis BOLT & NUT COMPANY
504 Malcolm Ave. S. E.
MINNEAPOLIS 14, MINNESOTA

LOOK FOR THIS STAMP OF U QUALITY

composition is continuously-fed from a 300-lb capacity pack through a flexible tube to the torch. The operator starts and continues welding to suit his requirements. Frequent stopping to change electrodes is unnecessary. The wire pack is supported and rotated on a motor-driven turntable, controlled so that wire tension at the feed rolls is minimized. The large wire pack provides at least one week's supply with average welding conditions.

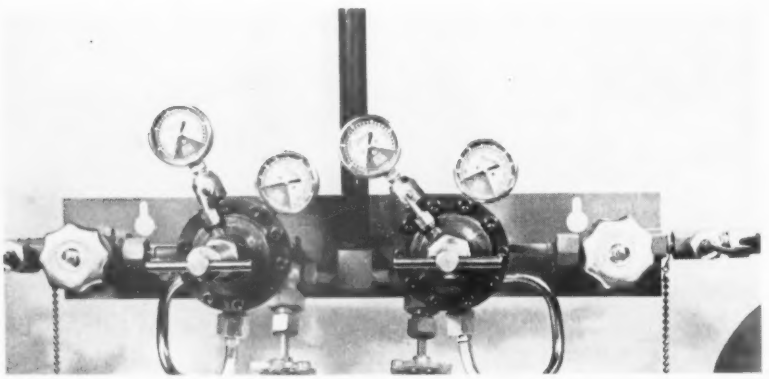
Magnetizable flux is placed in a dispenser and fed from this point through a flexible tube to the torch. The dispenser is designed to measure out exactly the quantity of flux required for the amount of wire that is being fed. The dispenser can be adjusted to feed different flux-to-wire ratios, but the usual ratio is between ⅜ to ½ lb of flux per lb of wire. This predetermined ratio is automatically maintained regardless of the rate of wire feed.

The flux is fluidized at the dispenser in a stream of welding-grade carbon dioxide gas. The gas, supplied from the usual commercial containers, is regulated as to pressure and flow and carries the flux to the torch suspended in the gas stream.

At the torch nozzle, the magnetic field created by the electric current passing through the wire, magnetizes and attracts the flux to the wire. As a result, the wire is coated as it is fed into the arc. The flux melts and serves, together with the shielding gas, to stabilize the arc and the stream of molten metal passing through it to the puddle, and to protect the puddle from atmospheric contamination; to refine the molten metal by deoxidation; to provide the desired control of weld contour by its effect on surface tension; and to provide the desired cooling rate of the weld metal by its blanketing and insulating action.

The welding current is supplied by a direct current power source. The arc characteristics of Unionarc welding are similar to those of covered electrode welding. The small amount of spatter produced is not tenacious, and can be removed by wiping or light brushing. Manual skill and dexterity requirements are equivalent to, or are less than, those for covered electrode welding.

The sequence of starting and stopping the flow of current, wire, flux and gas, as well as the maintenance of proper welding conditions, is regulated through an electronic control unit. The torch is rated at 450 amp continuous duty. *Linde Air Products Company, a Division of Union Carbide and Carbon Corporation, Dept. RLC, New York.*



Multiple Manifold

The Oxweld M-35 oxygen cylinder manifold is designed to handle an unlimited number of cylinders. Basically, the manifold accommodates two cylinders, one on each side of the operating controls. Straight or curved extensions are then added in single or double rows to either bank, to manifold any number of cylinders. The unit was developed to supply any amount of oxygen to a piping system for welding, cutting or other uses.

One bank of cylinders can be operated independently while those in the other bank are in reserve or being changed. Both banks may be operated simultaneously. In alternate operation, the reserve cylinder bank automatically picks up the oxygen load when the supply in the operating bank is used. This makes it possible to leave the manifold completely unattended until all cylinders are exhausted.

Units similar in operation to the M-35 are available for water or oil-pumped inert gases, such as argon, nitrogen, and helium; for high-pressure fuel gases, such as hydrogen and methane; and for liquefied petroleum gases, such as propane, butane, and pyrofax. *Linde Air Products Company, Dept. RA, 30 East 42nd st., New York 17.*

Contour Saw

The DoALL Model 5 band saw operates on the stationary work-piece, moving-tool concept of contour sawing. This is proposed as a better arrangement with heavy, ungainly or unbalanced material. The saw has a work capacity of 70 sq ft and will produce straight cuts 14½-ft long. Stacking of large, off shaped parts to be sawed is another application of this machine.

Contour sawing is thought the best method to make aperture cuts, especially if a large volume of unwanted material must be removed in usable pieces. With this machine the resulting surface has dimensional accuracy, good finish, and is free from surface hardening and flash that impedes further machining, say the

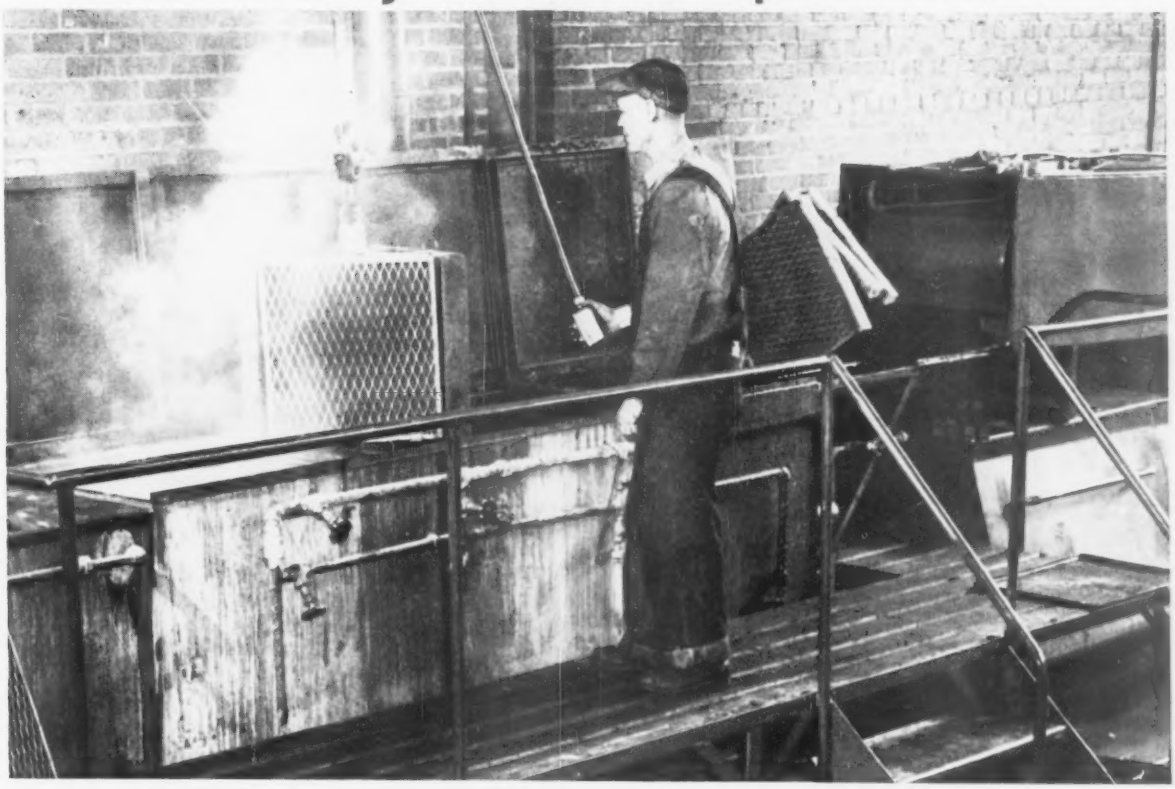
(Continued on page 92)

ENGINEER'S FIELD REPORT

PRODUCT CHEVRON* FILTER COAT

FIRM MILWAUKEE R.R. Seattle, Washington

Special adhesive coating increases efficiency of filters up to 50%

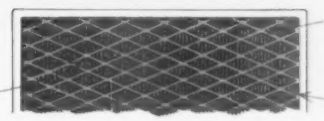


THE MILWAUKEE ROAD has found Chevron* Filter Coat increases the efficiency of its air filters as much as 50% compared to the oils they previously used—according to the District Diesel Supervisor. They have used this product on impingement-type car-body and engine-air filters since 1953, when it was first introduced.

To service the great number of filters in use, the railroad installed a special production line. Process starts with a thorough steam and chemical cleaning of filters. They are then dipped (above) in heated Chevron Filter Coat. After draining 15 minutes, filters are placed in drying ovens.

Chevron Filter Coat gives complete protection not only against heavy dirt and dust, but also grit from sanding. Even under adverse operating conditions, Chevron Filter Coat does not drip off screens, but maintains its high wicking ability, and keeps dust and grit out of engines.

Why Chevron* Filter Coat ups efficiency of air filters



- Will not drip off screens—gives full filtering efficiency through entire service period.
- Easily applied and cleaned.
- High wicking ability—quickly soaks dust particles.

*The Chevron Brand covers the line of industrial products formerly sold under the Calol name. This is a name change only. The high quality and specifications remain the same.

CHEVRON Industrial Lubricants

TRADEMARK "CHEVRON" AND DESIGN REG. U.S. PAT. OFF.

For More Information about this or other petroleum products, or the name of your nearest distributor, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20

THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

THE CALIFORNIA COMPANY, Denver 1, Colorado

FRAHM® and JAGABI®
Speed Measuring Instruments
. . . to meet every requirement
Write for Bulletin 35-X
JAMES G. BIDDLE CO.
Electrical & Scientific Instruments
1316 ARCH STREET, PHILADELPHIA 7, PA.
BE SURE YOU'RE ON THE RIGHT TRACK
ALWAYS SPECIFY
MEGGER®
Electrical Resistance
Measuring Instruments
. . . for all electric, Diesel-electric locomotives and other electrical equipment testing requirements.
Write for File RR #1

HELPS FROM MANUFACTURERS

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

VINYL SHEETING. 4-page folder describes Masland Duran Clad, a new semi-rigid vinyl that can be laminated to sheet metal or continuous coils and then formed into product components. Includes samples in color. (Write: *Masland Duraleather Company*, Dept. RLC, Philadelphia 34, Pa.)

ELECTRODE DATA. 24-page book (NH-504) includes information on AWS-ASTM arc welding electrode specifications; how to estimate electrode consumption; summary of welding symbols; factors in selecting electrodes, and other data for users of arc welding. (Write: *National Cylinder Gas Company*, Dept. RLC, 840 North Michigan ave., Chicago 11.)

TEFLON TUBING. Bulletin T-200 discusses electrical properties of thin-walled Teflon tubing for sheathing cables; for slip-on and sleeving insulation in motors, generators and transformers, and for instrument wiring in communications, electronics, locomotive, marine and other equipment. (Write: *Haolocarbon Division, Haveg Industries, Inc.*, Dept. RLC, 900 Greenbank Road, Wilmington 8, Del.)

FASTENERS. 4-page folder describes stainless-steel and aluminum fasteners—thread cutting screws, sheet metal screws, machine screws, cap screws, washers, bolts, nuts, etc. (Write: *Accurate Threaded Fasteners, Inc.*, Dept. RLC, 2901 Montrose Ave., Chicago 18.)

METALLIZING POWDER.—Engineering Data Sheet No. 53 discusses properties, characteristics and use of Colmonoy C-250 metallizing powder for crankshaft bearing surfaces. Includes also an 11-step application procedure. (Write: *Wall Colmonoy Corporation*, Dept. RLC, 19345 John R. st., Detroit 3.)

PORTABLE SHAPE CUTTING MACHINE. 8-page form ADC 660B describes advantages and applications of the Airco No. 4 Monograph machine. Cutting range, weights, dimensions, etc., also given. (Write: *Air Reduction Sales Company*, a division of Air Reduction Company, Dept. RLC, 150 East 42nd st., New York 17.)

SPECTROGRAPHIC EQUIPMENT. 32-page illustrated manual, No. D-277, describes complete line of B&L equipment, from basic educational units to complex instruments required by research and testing laboratories. Also announces the Analytical Planning Survey, a planning service, under which spectrographic experts will make a complete study of an organization's requirements and recommend suitable equipment on the basis of their findings. (Write: *Bausch & Lomb Optical Co.*, Dept. RLC, 635 St. Paul street., Rochester, N. Y.)

AIRCOMATIC CUTTING. 24-page Catalog 3170 describes development and applications of Aircomatic cutting for straight-line and shape cutting of nonferrous metals, particularly plates and parts to be joined by gas-shielded arc welding. (Write: *Air Reduction Sales Company*, Dept. RLC, 150 East 42nd st., New York 17.)

AIR DISTRIBUTION GRILLES. Uni-Flo Grille Catalog No. 1415-12 includes descriptive data and illustrations of supply grilles; return, exhaust and transfer grilles, and accessories; also photographs of smoke tests showing performance of this equipment. (Write: *Barber-Colman Company*, Dept. RLC, Rockford, Il.)

BRONZE VALVES. 4-page Bulletin DH-25 describes solder end and silver-braze end bronze valves in gate, globe and check designs. Includes also physical characteristics and construction details. (Write: *R-P&C Valve Div., American Chain & Cable Co.*, Dept. RLC, Reading, Pa.)

HOSE CLAMPS. Form Cat. 300RG-56, a 12-page booklet, describes Punch-Lok hose clamps, grooved hose fittings, and special tools and replacement parts. Instructions on applications also given. (Write: *Punch-Lok Company*, Dept. RLC, 321 North Justice st., Chicago 7.)

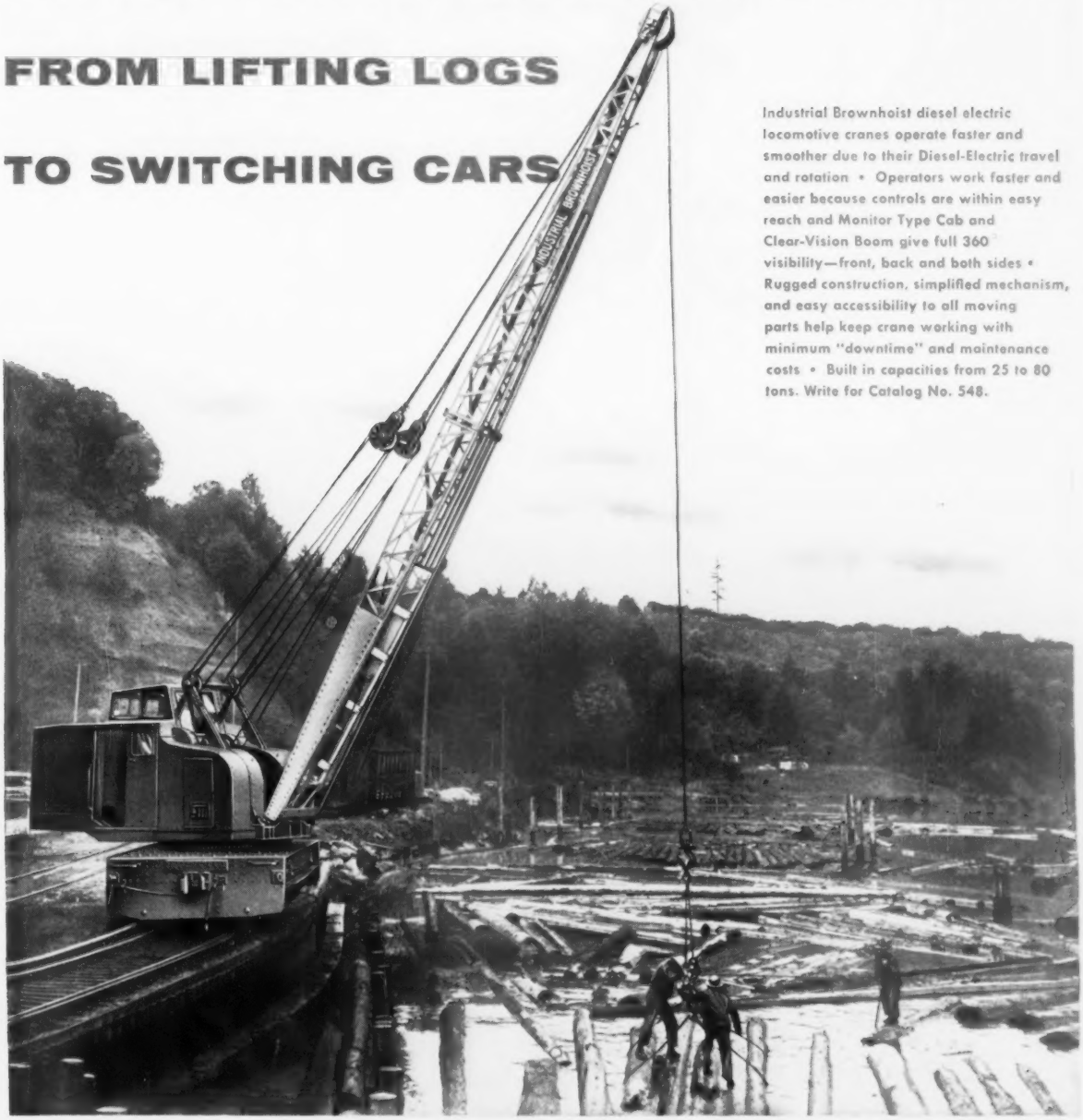
CINCINNATI MACHINES. General catalog No. M-1961 covers complete line of milling, grinding, broaching, and allied machines. (Write: *Cincinnati Milling Machine Company-Cincinnati Grinders Incorporated*, Dept. RLC, Cincinnati 9.)

"WROUGHT IRON FOR RAILROADS." 36-page booklet illustrates some outstanding mechanical and engineering railroad applications of wrought iron, including air-brake and steam piping; car charging lines; swing hangers; staybolts etc. (Write: *A. M. Byers Company*, Dept. RLC, P. O. Box 1076, Pittsburgh 30.)

PETRO-ENGINEERING SERVICE. 24-page illustrated booklet for industrial and commercial users of petroleum products tells what Petro-Engineering Service is; what it does; how much it costs; who needs it, and why. (Write: *Gulf Oil Corporation*, Dept. RLC, 1822 Gulf building, Pittsburgh 30.)

TYPE G 12 DIESEL-ELECTRIC LOCOMOTIVE. 8-page booklet describes the Type G 12 Henschel General-Motors 1,310-hp. diesel-electric locomotive. Illustrates details of construction. Curve diagram shows tractive force and speed. (Write: *Henschel*, Dept. RLC, c/o Georg J. Linder Continental European Representative, (16) Frankfurt a.Main, Wittelsbacher Allee 60, West Germany.)

WHY INDUSTRIAL BROWNHOIST LOCOMOTIVE CRANES SPEED UP JOBS FROM LIFTING LOGS TO SWITCHING CARS

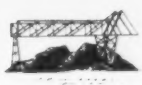


Industrial Brownhoist diesel electric locomotive cranes operate faster and smoother due to their Diesel-Electric travel and rotation • Operators work faster and easier because controls are within easy reach and Monitor Type Cab and Clear-Vision Boom give full 360° visibility—front, back and both sides • Rugged construction, simplified mechanism, and easy accessibility to all moving parts help keep crane working with minimum "downtime" and maintenance costs • Built in capacities from 25 to 80 tons. Write for Catalog No. 548.

BROWNHOIST

CLAMSHELL BUCKET

250 TON WRECKING CRANE


COAL-ORE BRIDGE

CAR DUMPER

LOCOMOTIVE CRANE

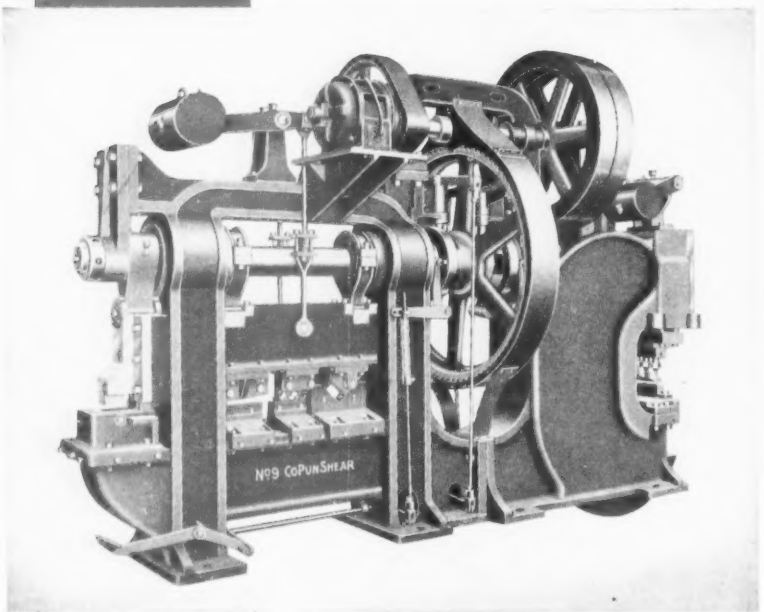
INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, Chicago, San Francisco, Montreal, Canada • AGENCIES: Detroit, Birmingham, Houston

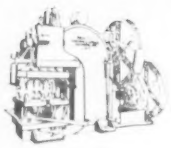
SUBSIDIARY OF Penn-Texas CORPORATION

199

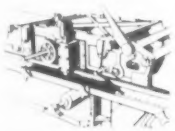
BEATTY CO PUN SHEAR

3-in-1 Machine Speeds Miscellaneous Repair Work





No. 11-B Punch



Spacing Table (SPI Type)

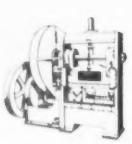
Cope — punch — shear without changing tools! This versatile combination of coping, punching and shearing tools can handle about 90% of the miscellaneous work required in the average repair shop — eliminates the time and work necessary to change tools on ordinary single-end machines. All tools are driven from a single motor and are operated with independent clutches.

Especially engineered to save time and increase output, the Co-Pun-Shear can punch three different diameter holes in one handling. Detachable shearing tool holders speed substitution of tools for special shapes; reduce down time.

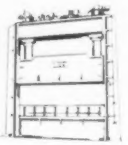
Write For Full Details

BEATTY
MACHINE & MFG. CO.

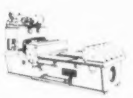
962 150th St.
HAMMOND, IND.



Guillotine Bar Shear



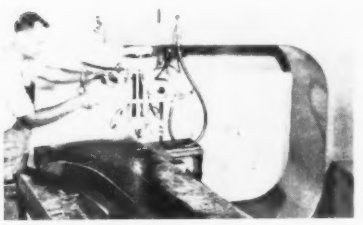
Vertical Bulldozer



Horizontal Bulldozer

EQUIPMENT

(Continued from page 88)



manufacturers. Much attention by the designers has been given to the power feeds and accessories to produce these operations.

The articulated construction of the saw was selected to achieve an extreme range and ease of handling. The power feed and cutting and guiding mechanism is carried by a yoke. The yoke, made of aluminum to reduce its inertia, is separated from the stationary floor mounted member by an intermediate unit. These three members are hinged on anti-friction bearings, providing the work capacity mentioned.

Yoke houses a 4 wheel variable speed band machine. The saw blade travels through guides mounted on tubular posts. Posts telescope to adjust to work thickness. Movement of the top post is transmitted to the bottom post and to the feed wheel. A handwheel on the top post permits 180 deg of twist in either direction. The lower feed wheel turns with the blade. The power feed wheel causes the entire yoke to move in the direction of the saw blade. Feed force is rheostat controlled, and the cutting head may be swung free when desired. Hydraulic motors in the yoke drive the two bottom band wheels, work light, etc. *DoALL Company, Dept. RLC, 254 No. Laurel ave., Des Plaines, Ill.*

100-Ton Jack

This 100-ton two-speed hydraulic jack, Model 100B-12, is a high-capacity type for handling extra heavy loads such as found in locomotive erecting shops, ma-

(Continued on page 94)

How Metallizing saves money in railroad shops

"Cold" metal build-up helps beat skyrocketing replacement costs—speeds maintenance jobs

Typical Railroad Metallizing Applications

Engine crankshafts, mains, throws, fits • Engine cylinders, liners, liner flutes • Water jackets, camshaft bearings • Generator, traction motor, other armature shaft bearing fits • Compressor crankshafts • Traction motor end housings • Pump rods and shafts • Eroded or corroded portions of engine blocks • Car lighting generator pulleys • Dents and scatches in car bodies

—practically any worn part repaired at only 15 to 20% replacement cost—get equipment back in service in hours, instead of days or weeks.

Some of the 28 major railroads using Metallizing:

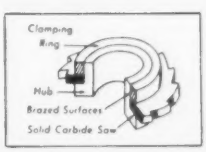
A.T. & S.F.	Missouri Pacific	Baltimore & Ohio
New York Central	Northern Pacific	Canadian National
Atlantic Coast Line	Pennsylvania	Chesapeake & Ohio

SPECIAL RAILROAD BULLETIN AVAILABLE—Illustrates and describes a number of these time-saving, money-saving metallizing applications. Data supplied by railroads using metallizing; photographs taken in user shops. Write for copy.

Metallizing Engineering Co., Inc.
1117 Prospect Ave., Westbury, L. I., New York • cable: METCO
In Great Britain: Telephone: EDGEWOOD 4-1300
METALLIZING EQUIPMENT COMPANY, LTD., Chobham near Woking, England

Now! CLEANER, FASTER COMMUTATOR UNDERCUTTING with the GAY-LEE SOLID CARBIDE SAW

These undercutting saws, universally used by diesel engine manufacturers and many railroads, are the logical choice for your own maintenance shops. Gay-Lee's patented "One-Unit Design" combines the higher speeds and longer life of a carbide blade with a strong, rigid steel hub for perfect alignment. The solid carbide blade and steel hub are brazed into a one-piece unbreakable unit that will not part during use or re-grinding. Available in "U" or "V" type.



MANUFACTURED UNDER LICENSE PATENT NO. 2,422,404

Send diameter, arbor size and thickness desired for quotation.

GAY-LEE COMPANY
CLAWSON • MICHIGAN

in your rebuilding program the GRIPCO Brake Beam Safety Support

gives added safety at minimum cost

SPRING-PLANK TYPE

can be designed for ANY Brake Beam

The Gripco Brake Beam Safety Support provides the greatest safety at lowest cost. Its dependability has been proven over years of actual service. Gripco Safety Supports are low in original cost, low in application cost and low in maintenance cost, even after years of service.

SPRING-PLANKLESS TYPE
(Safety Loops Included)

1. Supports the brake beam in event of brake beam or hanger failure.
2. Holds brake beam in horizontal position.
3. Holds brake shoes in proper position in relation to the periphery of the wheel.
4. The brake release feature pulls brake shoes away from wheel contact instantly when brakes are released.
5. Prevents unnecessary wheel and shoe wear caused by dragging brake shoes.
6. Gripco Supports can be removed and replaced without removing nuts.
7. Gripco Supports also function as a foundation brake gear control.
8. Brake Beams, rods and levers are held in position under spring tension thus reducing false movements, chattering and wear of parts to a minimum.

A.A.R. APPROVED—PATENTED AND PATENTS PENDING
OTHER GRIP NUT PRODUCTS

Grip Lock Nut #1 | Grip Holding Nut #2 | Railroad Gripco Lock Nut #3

GRIP NUT COMPANY
Serving American Railroads Since 1904
106 BROAD ST., • SOUTH WHITLEY, IND.

EQUIPMENT

(Continued from page 92)

chinery moving and bridge building. It has a lifting height of 6⅛ in.

To permit rapid engagement of the load, the jack is equipped with a tandem pump. By actuating both high-speed and high-lift plungers, the operator brings the ram in contact with the load. Using the high-lift plunger alone, the load is then lifted. Dual release valves in the base can be operated from either side. The jack base is drilled and tapped for an optional pressure gauge. *Western Railroad Supply Company, Dept. RLC, 2400-2434 South Ashland ave., Chicago 8.*

Teflon Tapes

A complete line of cementable, glass-supported (glass cloth reinforced) and unsupported Teflon tapes has been announced. Teflon, which has an extremely low coefficient of friction can now be cemented to virtually any type of surface. It is corrosion-resistant, and features excellent electrical properties.

Now available in glass reinforced form, CDF cementable, glass-supported Teflon permits applications previously considered impractical or impossible with unsupported tape. The glass-supported material differs from the unsupported tape in that it is reinforced with finely-woven strong glass cloth, giving it increased abrasive resistance, higher tensile strength, lower cold flow, improved dimensional stability, and generally superior mechanical properties.

Both CDF cementable glass-supported and unsupported Teflon can be bonded with ordinary adhesives to practically any surface including metal, plastics, glass, wood, ceramics, and rubber. Produced in widths from 1/4 in. to 12 in. and in thicknesses from .002 in. to .060 in., the tapes are available with either one or both surfaces treated for adhesion. The cementable surface is produced by treatment with a sodium ammonia mixture.

The materials are used for motor and generator insulation and also for mechanical purposes such as non-sticking chute and hopper linings, facings for conveyor belts and guide rails, non-corrosive linings for chemical vats and containers, etc. *Continental-Diamond Fibre Corporation, Dept. RLC, Newark, Del.*

ARC • SPOT miller GENERATORS WELDERS

. . . WORLD'S LONGEST LINE OF WELDERS

Here's the List--

A-C Transformer Type
in 16 models from 20 to 800 amperes

A-C Submerged Arc Type
3 models, 150 to 1875 amperes

D-C Selenium Rectifier Type
12 models, 3 to 1500 amperes

D-C Selenium Rectifier Constant Potential Type
3 models, 300 to 1000 amperes

A-C/D-C Combinations for Metallic Arc Welding
6 models, 10 to 525 amperes

Spotwelders
14 models, 1.5 to 20 KVA

A-C and D-C Engine Driven Welders/Power Plants
6 models, 15 to 350 amperes

A-C/D-C Combinations for Inert Gas/Metallic Arc Welding
8 models, 10 to 550 amperes

A-C Inert Gas Welders
23 models, 5 to 700 amperes

High Frequency Units
9 models, up to 1000 ampere capacity

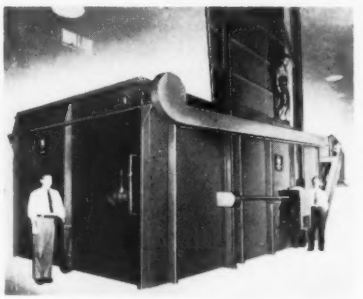
High Frequency Units with Water/Gas Controls
8 models, up to 1000 ampere capacity

PLUS: control panels, remote control units, water coolant systems, electrodes, electrode holders, running gear and welding accessories.

What's more, "... if it's Miller you know it's the finest..."

miller ELECTRIC MANUFACTURING CO., INC.
APPLETON • WISCONSIN

Distributed in Canada by Canadian Liquid Air Co., Ltd. Montreal, P.Q



Heavy-duty Cleaning Machine

This addition to the heavy-duty series of cleaning machines, specifically designed to clean six-wheel diesel locomotive truck assemblies, crankcases and engine parts, performs on the Aja-Dip principle which is an electro-mechanical drive. Its great size and capacity are believed minimized by its push-button operation. One button lifts and lowers the cover and the other button station activates the agitation motor.

The unit is 35 ft long, overall, 15 ft wide, and 20 ft high. The load capacity is 14,000 lb and the liquid capacity is 18,000 gal of cleaning solution. A fluid-coupled 40-hp motor powers the raising and the lowering of the carrier within the tank. The fluid coupling is an aid to easing shock loads. Fifty-two up-and-down motions per minute function within an 8-in. stroke. This movement does the cleaning, leaving the parts in a rinsable condition ready for reassembly or reconditioning.

The manufacturer of this machine reports savings up to 95 per cent in labor, 60 per cent in cleaning solution, and 90 per cent in man-hours. The loading and the unloading of the pieces is said to be the only labor required. *Magnus Chemical Company, Equipment Div., Dept. RLC, Garwood, N. J.*

(Turn to page 98)

a three way combination to greater savings . . .

DOUBLE SEAL RINGS
Cast from GUN IRON for longest wear and designed with wide face to eliminate piston slap. Other features include double seal action and a flexibly bonded sealing tongue that eliminates breakage.

AIR COMPRESSOR CYLINDER
Cast from GUN IRON for longest wear and designed with 42% greater cooling area for lower operating temperatures. Lower operating temperatures reduce condensation and carboning of valves.

AIR COMPRESSOR PISTON
Cast from GUN IRON for longest wear and designed to receive wide faced Hunt-Spiller Double Seal Rings for improved oil control and smoother operation.

HUNT-SPILLER
REPLACEMENT PARTS

The air compressor parts shown here are all cast from Hunt-Spiller GUN IRON . . . a dense cast iron that is melted under rigid metallurgical control. Its properties, found in no other metal, provide long life and highest resistance to wear. In addition, these replacement parts incorporate many unique design details. Specify *all three Hunt-Spiller replacement parts*, and attain all of these money saving advantages:

- **Highest resistance to wear**
- **Reduced operating temperatures**
- **Minimum carryover of oil and moisture**
- **Less carboning of valves**

Write for Bulletin H-4 *"Gun Iron, Your Key to Lower Cost"*

HUNT-SPILLER
MANUFACTURING CORPORATION
383 DORCHESTER AVENUE · BOSTON 27, MASSACHUSETTS

CANADIAN REPRESENTATIVE
Joseph Robb & Co., Ltd., 4050 Namur St., Montreal 16, P.Q.

EXPORT AGENTS
International Rwy. Supply Co., 30 Church St., New York 7, N.Y.

New oil sets record in 330,000-mile

GULF DIESELMOTIVE protects rated power of high-output

The pictures tell the story. Gulf's new Dieselmotive 78 keeps engines cleaner — longer. But that's not all. *This new oil enables high-output Diesels to deliver their full rated power . . . under certain conditions, it can actually increase the tonnage ratings!*

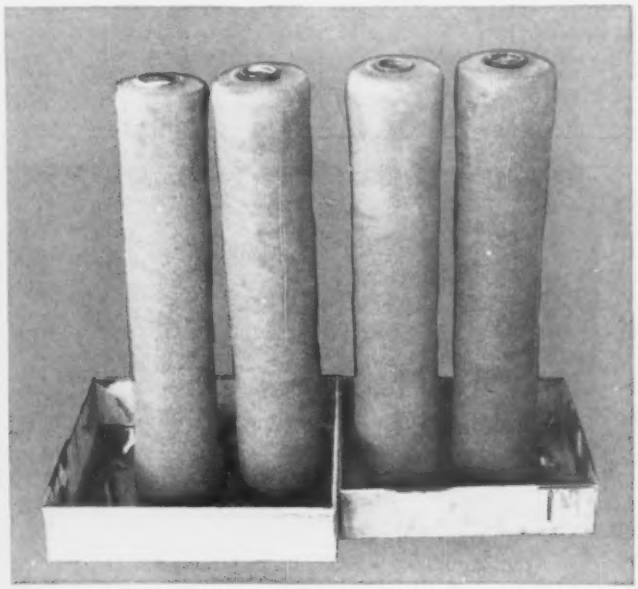
Southern Pacific put Dieselmotive 78 through a series of grueling tests in EMD 567-C units on Southern Pacific lines in Texas and Louisiana. You know the run—from hot and humid lowlands to chilly mountain passes . . . temperatures ranging from 110 to zero degrees. Tough hauls up steep grades . . . long runs through dust, heat and cold.

After 165,825 miles, the engines were disassembled. Rings, pistons and liners showed amazingly little wear. There were no heavy deposits or varnish anywhere. Main bearing shells were so near-new they were re-installed for further service.

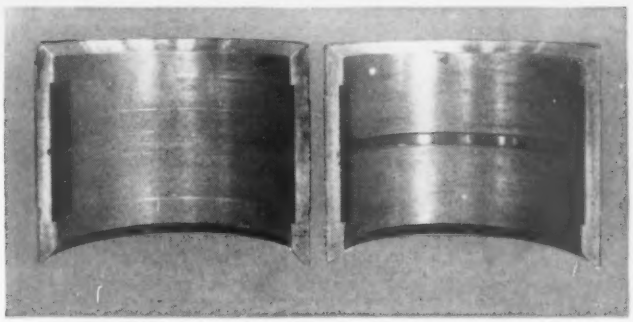
You can see how engines as clean as this deliver all the power built into them. Com-

test . . .

After 165,825 test miles on Dieselmotive 78, pistons and liners when removed looked like this. All parts were clean, free of deposits and showed negligible wear.



Filters are free of heavy sludge. Dieselmotive 78 has about twice as much additive as ordinary Diesel engine oils. This additive reserve insures cleaner engines, less wear, than ever before.



Note clean appearance of connecting rod bearings immediately after removal from engines. Gulf Dieselmotive 78 retains its stability and lubricity even when subjected to high temperatures for extended periods.

78 OIL engines

pression is maintained, insuring continued high engine efficiency.

Gulf Dieselmotive 78 is now being demonstrated on the Missouri Pacific and Seaboard Airline Railroads. Why don't you try this new and better oil? Merely contact the Gulf engineer at your nearest Gulf office for any help you need. Or, write for more data.

GULF

GULF OIL CORPORATION

1822 Gulf Building, Pittsburgh 30, Pa.

EQUIPMENT

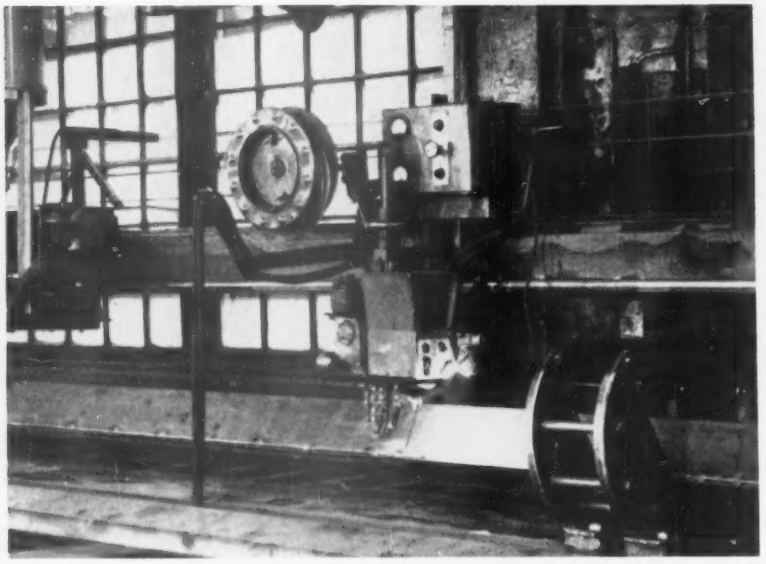
(*Continued from page 94*)

Degreasing Solvents

These nonflammable Freon solvents for vapor degreasing or cleaning by liquid immersion, oil, grease, and dirt without harming delicate metal parts or electrical insulation, yet are safe enough to use in ordinary work areas with conventional ventilating equipment, according to the manufacturer. They are said to be nonflammable and nonexplosive, for use in open shop areas, and their inhalation toxicity low.

When cleaning electrical motors, both new and reconditioned, the problem has been the tendency of cleaning solvents to attack the insulation on wiring, weakening it enough to cause short-circuits. Three years of tests indicate that these degreasing solvents will not soften or check any of the commonly used insulation.

Three types are available in 10- to 55-gal containers. Freon MF, has a boiling point of 75 deg F; Freon BF boils at 199 deg F, and Freon TF boils at 118 deg F. Portable cleaning tanks, unsuitable for use with more toxic or flammable solvents, are now being developed to make these solvents easy to use in small-scale cleaning operations. *E. I. du Pont de Nemours & Co., Dept. RLC, 7506 Nemours Bldg., Wilmington, Del.*



Fabricates top chord member for box car with Lincolnweld mounted on simple overhead beam.

Speed production with LINCOLNWELD

Easy to mount, simple to use, dependable in operation gives you:

LAF-3 for DC welding

LAF-4 for AC welding

- **best starting . . . uniform welds**
- **cold starts or hot starts**
- **variable voltage, constant potential power**
- **slow-to-fast inching speeds**
- **simple accurate positioning**

Send for Bulletin SB-1355. Write Lincoln Electric Railway Sales Company, 11 Public Square, Cleveland 13, Ohio. Railroad representative of

THE LINCOLN ELECTRIC COMPANY

Cleveland 17, Ohio

LINCOLN . . . one dependable source for all your arc welding needs

1000 Amperes for Submerged Arcs

A 1000-amp a-c transformer welder designed primarily as a power source for the submerged arc process has been announced by GE's Welding Department.

With an operating range of 325 to 1000 amp, the new single-phase welder has motor-driven current control. The controls regularly mounted on the welder case may be operated remotely by means of plug and receptacle control.

Open circuit voltages are 85 to 100 volts and the welders will operate on either 230 or 460 volts. Power factor correction is provided by capacitors. Built into the welder is a 2-kva control transformer, which can be used externally for operating of auxiliary equipment. All coils are protected by Class H insulation, rated for 130 deg C temperature rise. *General Electric Company, Welding Dept., Dept. RLC, Schenectady, N. Y.*

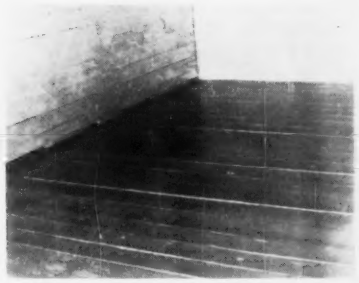
Spray Gun Receiver

A paint-spray gun receiver which keeps the nozzle tip in a solvent solution when not in use prevents paint from hardening

and may be located on the spray booth wall or bench. Gun rests in the receiver with hoses attached for convenience. An out-of-the way reservoir tank maintains the liquid level in the receiver. For safety, there is a perforated metal fire baffle in the gun port opening to prevent ignition of the solvent.

Multiple gun receivers are available as well as the single units described. Similar receivers are available to keep the paint hose quick-connector ends in solvent when not in use. *Protectoseal Company, Dept. RLC, 1920 South Western ave., Chicago 8.*

Upgrading Equipment And Materials



Box Car Upgrader

Continental upgrader S-367, according to the manufacturer, will upgrade the floor of a 40-ft box car in average condition in 30 to 40 min, at an average cost of $15.

The material, a composition of wood flour and resins, reportedly stain resistant, is applied in semi-liquid form with a floor broom. It is said to dry to a wood-like hardness in a few hours, binds floor splinters together, seals small cracks, smooths rough floors, repels infestation, hides and thoroughly seals grease spots, oil stains, etc.

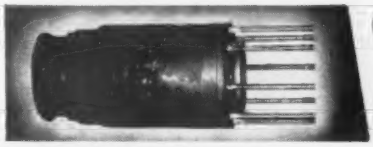
The manufacturer claims once a floor has been upgraded with this material, areas worn through later may be "spot patched," making it unnecessary to upgrade the entire floor again. *Armstrong Paint & Varnish Works, Dept. RLC, 1330 South Kilbourn ave., Chicago 23.*

Plastic Upgrader

Armortex is a tough mastic with a plastic base material which bonds to box-car floors and walls after initial application. The spray-brush grade was described on page 6 of the February 1956 issue. It would seal cracks up to 1/16 in.

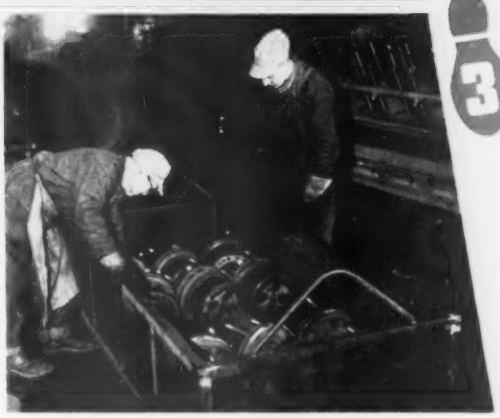
A caulking grade, which can be used to seal in larger cracks up to 1/2 in. and

3 EASY STEPS TO SAVE YOU MONEY!



1 Start with dirty, carbon encrusted diesel engine liner (or any other diesel parts to be cleaned).

2 Place the liner (or any other diesel parts to be cleaned) in cleaning basket and submerge into Lix Diesel Klean Heavy.



3 In less than half the usual time inspect the diesel liner, (or other diesel parts) . . . and when thoroughly cleaned, just rinse with water or mineral spirits.

You get THIS . . .

AT LESS COST, BECAUSE "LIX DIESEL KLEAN HEAVY" SOAKS AWAY CAKED CARBON.

No brushing or scraping is necessary. Time and hard labor is reduced to a minimum. Lix is harmless to all types of metals during their cleaning cycle.

Pistons, Bearings, Injection Nozzles, in fact all working parts of diesel locomotives can be cleaned faster, better and safer with Lix Diesel Klean Heavy.

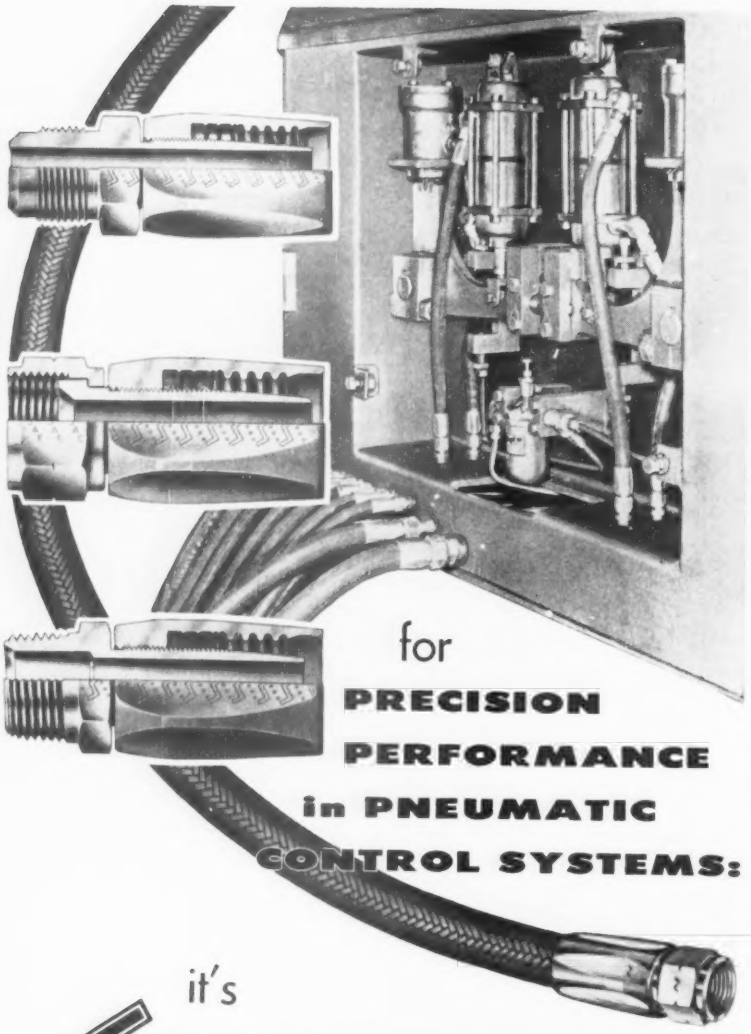
Write, wire or phone for a representative to demonstrate in your shop. No obligation!

Manufacturers of Lix Diesel Klean Heavy and Lix Electric Equipment Cleaner

THE Lix CORPORATION
(OF MISSOURI)
PRODUCTS OF RESEARCH

716 EAST 85TH STREET, Dept. RL-4
KANSAS CITY, MISSOURI

Leadership in Industrial Cleaning"



For pneumatic control systems and air brake applications that require superior hose and fittings, specify Stratoflex. Stratoflex hose provides the flexibility, small bend radii, and durability that is essential for long and dependable service. Stratoflex fittings assure leak-proof connections under extreme pressure variations. They are quick on-and-off and are detachable and reusable. WRITE FOR BULLETIN S-2H

STRATOFLEX Inc.
P.O. Box 10398 • Fort Worth, Texas
Branch Plants: Los Angeles, Fort Wayne, Toronto
In Canada: Stratoflex of Canada, Inc.

Sales Offices:
Atlanta
Chicago, Dayton
Houston
Kansas City
Los Angeles
New York
San Francisco
Seattle, Toronto
Tulsa

gouged out areas in the linings, floors and door posts, is now available. It is of the same basic material as regular Armortex, but of a much heavier consistency. It can be troweled into the larger cracks, or applied with a caulking gun where a continuous bead is desired to seal the deck ends or any long crack.

The caulking grade Armortex comes ready for use and does not require any mixing. It is odorless, non-staining and non-toxic. Roads using the caulking grade, it is said, can seal a car in average condition for grain loading with approximately one to two gallons per car, and on the following day the car may be loaded. *J. W. Mortell Company, Dept. RLC, Kankakee, Ill.*

Other Upgrading Materials Described During the Past Year

In Railway Locomotives and Cars

Corrosion Resistant Neoprene Coatings.—GACO N-700, a liquid neoprene coating, which, according to the manufacturer, makes a firm bond with steel and will not crack, chip or soften. (See page 108, March 1956.) *Gates Engineering Company, 100 S. West st., Wilmington 99, Del.*

Center Door Posts. — The Claim Saver center door post fits any size box car and requires no structural changes to the car. It carries 75 per cent of the weight in doorway openings to protect regular wooden door posts from splitting and twisting. (See page 88 January 1956.) *Railroad Engineering Corporation, Aurora, Ill.*

Glid-Iron.—This is a 100 per cent solids resin coating which can be applied to wood or primed metal by spray, brush, roller or squeegee in any mil thickness. (See page 99, March 1956.) *Glidden Company, Cleveland.*

Lining Laminate. —Conoglas is a glass fabric reinforced polyester laminate for lining bins, tanks, freight cars, etc. It is white and flexible, stain-resistant and waterproof. (See page 85, February 1957.) *Continental Can Company, Conolite Div., 205 West 14th st., Wilmington 99, Del.*

Box-Car Liner.— Conolite is a laminate of polyester resin and glass cloth developed to protect box-car walls from wear and impact. (See page 6, March 1957.) *Continental Can Company, Conolite Div., 205 West 14th st., Wilmington 99, Del.*

In Railway Age

Freight-Liner.— The Freight-Liner system is a "package" consisting of a fiberglas cloth and a plastic material for patching bad spots in car lining or floors, or for complete relining of a car. The plastic and fiberglas for doing the whole relining job, however, are different from those used in patching work, but both are

(*Continued on page 102*)

America's foremost engineered lettering tools

designed to reduce your present costs

50 to 80%

Used today by 1/3rd of the Nation's leading Railroads . .

DN

Spray it—

STENCILS

PRESSURE SENSITIVE TYPES

Easy to apply. No skill required. Produces the most accurate and durable type of lettering, numerals, medallion, and other types of markings. Adds long life to your identification or advertising on all your equipment . . .

Whatever your lettering problems may be regarding identification, advertising, reflective or non-reflective, the DEMP-NOCK LETTERING SYSTEMS can help you get the job done in less time.

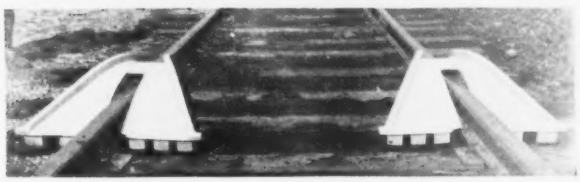
For additional information write Dept. RR-100

THE DEMP-NOCK COMPANY

31433 MOUND ROAD • VAN DYKE, MICHIGAN • U.S.A.

DEMP NOCK

NOLAN RERAILERS



WILL RERAIL ANY TYPE OR SIZE OF LOCOMOTIVE OR CAR IN RECORD TIME!

Thousands in use by railroad operators all over the world. Recommended by Safety Inspectors and Engineers. Built of special alloy heat-treated steel for rugged service. Nolan Rerailers are used in pairs, and will retrack wheels from either or both sides of rail at same time. Each Rerailer straddles the rail, with the narrow end on top of the rail. The derailed wheel comes up the gradual slope, and is forced back on to the rail by the guiding grooves and ridges. Can be used anywhere on the track.

Size of Rerailer	*For Use on Rails as Follows*	*Locomotive or Car Capacity*
No. 2	16 lbs. to 40 lbs.	10 tons
No. 3	30 lbs. to 60 lbs.	15 tons
No. 3½	40 lbs. to 70 lbs.	20 tons
No. 4	50 lbs. to 75 lbs.	40 tons
No. 5	70 lbs. to 100 lbs.	100 tons
No. 5½	85 lbs. to 133 lbs.	200 tons
No. 5¾	85 lbs. to 155 lbs	300 tons

F.O.B. Bowerston, Ohio

Send Order Now! Immediate Delivery. Complete Satisfaction Guaranteed. Free Descriptive Literature.

THE NOLAN COMPANY

171 PENNSYLVANIA STREET
BOWERSTON, OHIO

Rough country on pins and bushings . . . best reason for specifying Ex-Cell-O

Colorado country is beautiful—but rough on pins and bushings. As passenger cars stretch and strain over torturous mountain passes abrasive sand and grit want to eat away at the finish of pins and bushings. No wonder Ex-Cell-O is first choice by over 200 railroads!

A diamond-hard steel case and a super-fine finish resist wear and abrasion. Electronically controlled heat treating and precision grinding assure you of longer wear under the most severe conditions.

You *know* the Ex-Cell-O reputation . . . do you know your Ex-Cell-O representative? Why not contact him or Ex-Cell-O, Detroit.

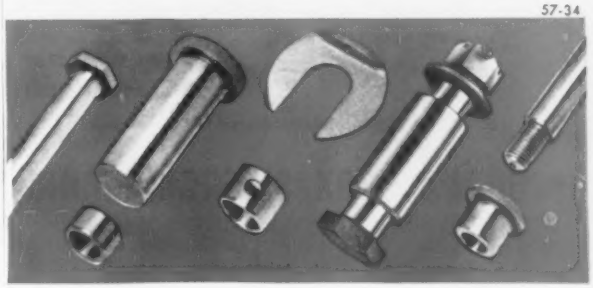
EX-CELL-O CORPORATION

EX-CELL-O FOR PRECISION

XLO

RAILROAD DIVISION, EX-CELL-O CORPORATION, DETROIT 32, MICHIGAN

57-34



THE JBS ACME JOURNAL LUBRICATOR
—THE *LOWER COST* LUBRICATOR
THAT FULFILLS ALL REQUIREMENTS

AAR APPROVED FOR 10,000 CARS
IN GENERAL INTERCHANGE SERVICE

Heavy loop pile surfaces designed for easy application and removal . . . special unsized duck casing. REINFORCED SIDING TO STAND EXTRAORDINARY WEAR AND TEAR.

100% wool-batt core . . . quilted construction to assure stability . . . available in two sizes: 9-10 for 9″ and 10″ AAR standard journal boxes and 11-12 for 11″ and 12″ standard boxes.

A POSITIVE ADVANCE
IN JOURNAL LUBRICATION

- CANNOT POSSIBLY GLAZE!
- IS UNAFFECTED BY TEMPERATURE CHANGES.
- Contains an UNUSUALLY LARGE OIL RESERVOIR.
- IS RECLAIMABLE!
- HAS EXCEPTIONAL WICKING and FILTERING qualities.

JOURNAL BOX SERVICING CORPORATION

"30 Years in Car Lubrication"
Sales Office: 332 S. Michigan Ave., Chicago 4, Ill.
General Offices: 1111 S. Keeler Blvd., Indianapolis 24, Ind.

EQUIPMENT

(*Continued from page 100*)

applied in the same manner. Cars are ready for use in 3-6 hr after upgrading work is done. One layer of the material is said to provide strength to withstand normal pressures. If desired, the material can be laminated, layer on layer. The Freight-Liner material is said to remain firm at temperatures up to 240 deg F and does not get brittle at temperatures down to —30 deg F. It can be cleaned with detergents, disinfectants or steam. (See page 48, May 28, 1956.) *Archer-Daniels-Midland Company, 700 Investors Bldg., Minneapolis 2.*

Car Insecticide. — This insecticide contains pyrethrins and piperonyl butoxide. It is sprayed from an electric powered "Mistorizer" or Westone sprayer, and at least 1 gal per car is sprayed to prevent infestation of grain and flour in transit. The insecticide is said to have no objectionable odors and will not corrode metals. (See page 42, May 28, 1956.) *West Disinfecting Company, 42-16 West st., Long Island City 1, N. Y.*

Hard Surface Upgrading Material.—A hard surfacing material for freight-car lining, the Espey Carliner, can be applied to any type of wood as well as to steel, although a primer may be needed for steel. Brushes are used to apply the resin to the car walls or floors. Espey can be used as a patching material for covering holes in car walls and floors. Its resistance to abrasion is intended to increase the life of car floors and walls. (See page 42, May 28, 1956.) *Spring Packing Corporation, 332 S. Michigan ave., Chicago 4.*

Stapling Hammer. — The Bostitch H2BR stapling hammer is intended for paper lining freight cars. The staple is made of galvanized wire, .103 in. wide, while staple legs are ⅜ in. long. The width of the staples is said to provide extra surface contact which keeps paper from tearing away from the walls of the car. The magazine holds 70 staples. (See page 43, May 28, 1956.) *Bostitch, 14 Briggs Drive, East Greenwich, R. I.*

Permanent Plastic Car Liner.— Leader-Kote 700 may be brushed or sprayed on walls or floors of freight cars to form a plastic liner. It is not affected by solvents and most acids and is nontoxic. This makes it acceptable for cars which carry grain, sugar or flour. (See page 43, May 28, 1956.) *Coatings Division, Leader Iron Works, Inc., 410 N. Michigan ave., Chicago.*

Corrugated Board Grain Door. —The Ford door has steel strap extensions so that faulty door posts may be by-passed and the door nailed to the first studs on each side. It is furnished in complete sets which can be handled by one man. (See page 52, May 28, 1956.) *Ford Grain Door Company, 110 N. 40th st., Omaha 3, Neb.*

Gasoline Powered Scraper. — The Model CR gasoline-powered scraper, it is said, can clean and smooth stock car floors in 50 per cent of the usual time. It is a 6-hp machine and is supplied with a cutter-equipped cleaning cylinder and a wire brush cylinder for smoothing and clean-up jobs. (See page 43, May 28, 1956.) *G. H. Tennant Company, 721 North Lilac Drive, Minneapolis 22.*

Portable Chipping Tool.—A portable chipping tool, designed for removing tough deposits from surfaces in hard-to-reach areas in cars, bins, etc., is powered by a ¾-hp (12,000 rpm) electric or air motor. The tool reportedly works from 12-20 times faster than a man with a hand scraper. Chipping action is provided by twin cutter-equipped cylindrical heads rotating at high speed. The machine is used for removing rust from steel, cleaning paint from surfaces, etc. (See page 43, May 28, 1956.) *G. H. Tennant Company, 721 North Lilac Drive, Minneapolis 22.*

Electric Power Sweeper—One man sweeps an entire box car in 3½ min with this model "36" sweeper with which it is estimated an experienced operator could sweep a typical car in approximately 2½ min. Manual sweeping time per car averages 9.3 min for two men with pushbrooms (18 or 19 man-minutes), according to car shop personnel of one railroad. (See page 43, May 28, 1956.) *G. H. Tennant Company, 721 North Lilac Drive, Minneapolis 22.*

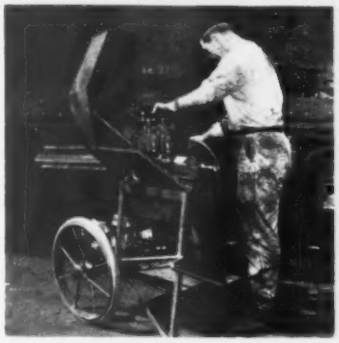
Cartite Upgrading Papers.— Most of the nine types of Cartite carlining papers consist of two sheets of 30-lb Kraft paper combined in a double coating processed by asphalt compounds. However, single sheets creped and waxed are available for use in cars where asphaltically bonded papers would be objectionable. The asphalt laminated papers are water repellent. Most of the asphaltic papers are reinforced with spun fibers to give increased tensile strength and tear resistance. Several of the papers are 18 per cent creped for increased puncture resistance, cushioning, flexibility and ease of application. Cartite papers are available in all standard size rolls, and special sizes. (See page 52, May 28, 1956.) *Brandon Equipment Company, 332 S. Michigan ave., Chicago 4.*

Dunnage Door.—The Hummel dunnage door weighs only 35 lb. It is a paper door with a strong reinforcing wood frame. The frame is 7 ft wide, while the paper is 9 ft. wide. The frame fits snugly into the car door and prevents leakage around the side of the door and at the bottom. The company also makes a "one-man" car liner. These liners are made in standard sizes to fit general types of cars. Coverings for walls and floors are one piece for each purpose. The liners can be made of any weight Kraft paper. (See page 42, May 28, 1956.) *Hummel Manufacturing Company, Hopewell, Va.*

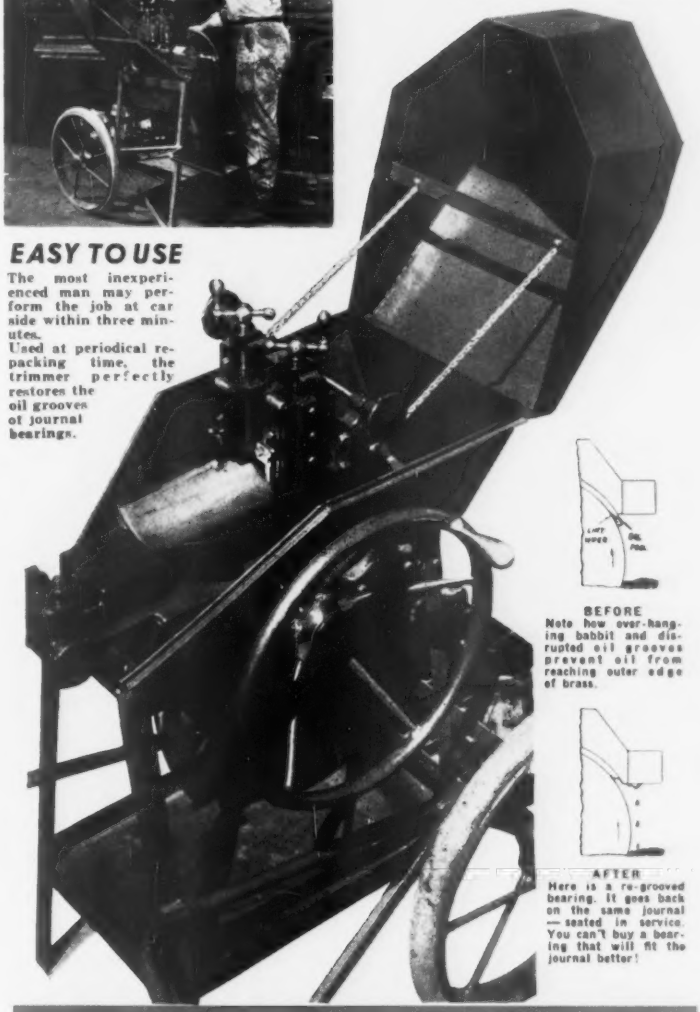
RENT or BUY . . .

THE FAMOUS JBS BRASS TRIMMER

SAVES $5.00 ANNUALLY PER CAR!*



*Many years of service records verify even greater savings!



EASY TO USE

The most inexperienced man may perform the job at car side within three minutes.

Used at periodical repacking time, the trimmer perfectly restores the oil grooves of journal bearings.

BEFORE

Note how over-hanging babbit and disrupted oil grooves prevent oil from reaching outer edge of brass.

AFTER

Here is a re-grooved bearing. It goes back on the same journal — seated in service. You can't buy a bearing that will fit the journal better!

BEARINGS BETTER THAN NEW!

ELIMINATES CRUCIAL BREAK-IN PERIOD

Trimming and reapplication to the journal from which removed results in the perfectly FITTED BEARING and eliminates the hazard of failure during the otherwise crucial break-in period of a new bearing.

AAR APPROVED

The trimming of bearings has been approved as a CHARGEABLE ITEM on cars in interchange.

JOURNAL BOX SERVICING CORPORATION

"30 Years in Car Lubrication"

Sales Office: 332 S. Michigan Ave., Chicago 4, Ill.

General Offices: 1515 E. Brewer Blvd., Indianapolis 22, Ind.

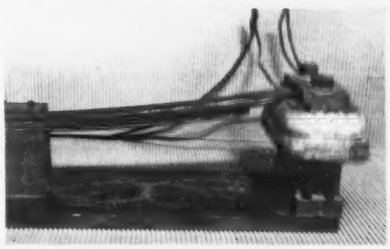
—ADVERTISERS IN THIS ISSUE—

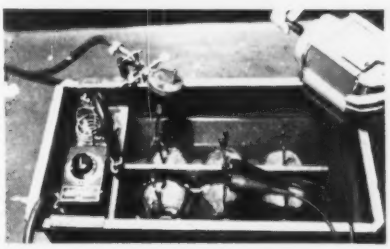
Aeroquip Corporation	15
Albertson & Co., Inc.	37
American Brake Shoe Company, Railroad Products Division	30-31
American Steel Foundries	24-25
Apex Tool & Cutter Co., Inc., The	28
Beatty Machine & Mfg. Co.	92
Biddle Co., James G.	90
Broderick & Bascom Rope Co.	23
Buckeye Steel Castings Co., The	29
Cincinnati Milling Machine Co., The	46
C & D Batteries, Inc.	10
Dana Corporation	35
Demp-Nock Co., The	101
Duff-Norton Company	86
Electro-Motive Division, General Motors	32-33
Esso Standard Oil Company	Inside Front Cover
Ex-Cell-O Corporation	101
Exide Industrial Division—Electric Storage Battery Co., The	19
Fairbanks, Morse & Co.	4
Fiellman American, Inc.	87
Gay-Lee Company	93
General Electric Co.	82-83
Grip Nut Company	93
Gulf Oil Corporation	96-97
Hunt-Spiller Manufacturing Corp.	95
Hyatt Bearings Division of General Motors	17
Industrial Brownhoist Corporation	91
Ingersoll-Rand	8-9
International Nickel Company, Inc., The	36
International Steel Company	11
Journal Box Servicing Corporation	102-103
Kaiser Aluminum & Chemical Sales, Inc.	26-27
Lewis Bolt & Nut Company	88
Lincoln Electric Company, The	98
Linde Air Products Company, a Division of Union Carbide & Carbon Corporation	3
Lix Corporation, The	99
Magnus Chemical Co., Inc.	13
Magnus Metal Corporation	77
Metallizing Engineering Co., Inc.	93
Miller Electric Mfg. Co., Inc.	94
Miller Lubricator Co.	28
Motor Wheel Corporation, T-Z Railway Equipment Co.	38
National Carbon Company, A Division of Union Carbide and Carbon Corporation	43
National Electric Coil Company	Inside Back Cover
National Malleable and Steel Castings Company	20-21
Nolan Company, The	101
Oakite Products, Inc.	18
Pullman-Standard Car Manufacturing Company	42
Railroad Friction Products Corporation	40-41
Roebling's Sons Corporation, John A.	39
Rolin Corporation, The	79
Sinclair Refining Company	44-45
Speer Carbon Co.	22
Sperry Rail Service, Division of Sperry Products, Inc.	85
Standard Car Truck Company	34
Standard Oil Company of California	89
Standard Railway Equipment Manufacturing Company	81
Stran-Steel Corporation, Unit of National Steel Corporation	7
Stratoflex, Inc.	100
Timken Roller Bearing Company, The	Back Cover
Wine Railway Appliance Co., The	Front Cover

"This index is an editorial feature maintained for the convenience of readers. It is not a part of the advertiser's contract and Railway Locomotives & Cars assumes no responsibility for its correctness."

for longer life and more reliable performance, use

National Polyester Moulded Field Coils





INCREASED STRENGTH

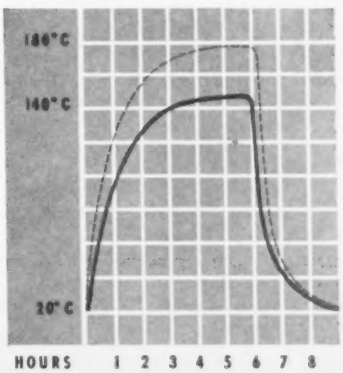
Complete polyester filling bonds all parts of the coil into a strong, unified, shock-resistant construction. The photograph at the left shows a shock test in which an energized and heated coil has been striking an anvil once a second for six months with no adverse effects.

GREATER RESISTANCE TO CORROSIVE ENVIRONMENTS

Complete polyester filling prevents penetration of moisture, oil, conducting dust, and other foreign matter that contribute to coil failures. The photograph at left shows a test in which National polyester coils were immersed successively in water, hot oil, and an iron filing solution. Periodic resistance tests show *no deterioration* of the insulation after several months submersion.

COOLER OPERATION

Absence of voids in the coil enhances heat transfer. The graph below shows comparative heating and cooling cycles for polyester-filled (solid line) and conventional varnish-treated (dotted line) field coils carrying the same amperage.



National polyester-filled field coils can be installed in National service shops or supplied for installation by your own motor maintenance crews. Call your nearby National field engineer or write for details.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A. TRADE MARK

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

"A CURE IS BETTER THAN *A CRUTCH"*

Crutches don't cure the Hot Box problem . . . but Timken® bearings do

. . . and TIMKEN bearings pay for themselves over and over and over in operating and maintenance savings

GIVING friction bearings "crutches" —devices attempting to improve performance—never cures the hot box problem. But Timken® bearings *cure* it, because they eliminate the *cause* of hot boxes—the friction bearing itself.

HOW SAVINGS MOUNT

Timken bearings eliminate the frequent inspection and lubrication that are necessary to keep friction bearings operating even with "crutches". Terminal bearing inspection is cut 90%. Lubricant costs are slashed as much as 95%. Fact is, the new Timken heavy-duty type AP (All Purpose) bearing assembly can go three years without the addition of lubricant. Costs less to use and to install too. When all railroads go "Roller Freight", they'll save an estimated $224 million a year, earn about a 22% net annual return on the investment.

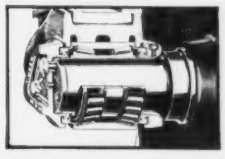
THE TAPER HOLDS THE "SECRET"

The reason Timken bearings eliminate the hot box problem is—they *roll* the load. They don't slide it as friction bearings do. There's no metal-to-metal sliding friction. And the reason Timken bearings are the only journal bearings you can count on to cure the hot box problem *and* cut costs to the bone is—their tapered roller design. It prevents lateral movement. There's no scuffing or skewing, bearings last longer. There's no pumping action, so less lubricant is required.

We even make our own bearing steel to assure Timken bearing quality. We take this extra step to be sure it's the finest, toughest steel available. No other American bearing maker does.

Compared to the cost of buying and maintaining "crutch" devices that never cure, the difference in price between friction bearings and roller bearings is smaller today than ever. Costs can be reduced even more, as shown by a practical conversion plan one major American railroad has adopted. Whenever a freight car of this railroad comes into its shops for major repairs, it is converted to roller bearings. This plan helps maintain a steady shop and labor schedule, reduces bearing installation cost.

CONVERTING THE PRACTICAL WAY

There's no longer any need to try and "get by" with costly "crutches". They don't cure the hot box problem. But Timken bearings *do*—and give maximum savings in operating and maintenance cost. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

Only TIMKEN® bearings cure the hot box problem and cut operating and maintenance cost to a minimum